SERVICE MANUAL

CRT DISPLAY

Diamond PLUS 230SB / Diamond PLUS 230SB -BK

(C22BW701)

NEC-MITSUBISHI ELECTRIC VISUAL SYSTEMS CORPORATION
SEPTEMBER 2002

CBB-S5783

X-RADIATION WARNING

The surface of pucture tube may generate X-Radiation.
Precaution during servicing, and if possible use of a lead apron or metal for shielding is recommended. To avoid possible exposure to X-Radiation and electrical shock hazard, the high voltage compartment and the picture tube shield must be kept in place whenever the chassis is in operation.
When replacing picture tube use only designated replacement part since it is a critical component with regard to X-Radiation as noted above.

CRITICAL COMPONENT WARNING

- In the schematic diagram/parts list, the components marked " ⚠ " are critical components for X-ray radiation.
  When replacing these parts, use exactly the same one indication in parts list.
- If one or some of the components listed below are replaced, the high voltage and the operating voltage of high voltage hold-down circuit must be re-adjusted according to Clause 2.4 ADJUSTMENT on page 2-6 :

T701, IC102, IC104, R706, R707

Contents

1. Circuit description

1. 1 Power block

1.1.1 Outline

The power block is compatible with the business electric power, 100 to 120VAC/220 to 240VAC (50/60Hz).
The active filter circuit is adopted to suppress the higher harmonic current.
The circuit block is composed of two switching regulators, the main power which is the configuration used the flyback converter system of pseudo resonance operation and the sub power which is the configuration used PWM (pulse wise modulation) system.
The output on the secondary side is shown in Table 1.

Power block	Output voltage	Mai load
Main power side	+215V	H. deflection circuit, Cu-off circuit
	+80V	Video circuit, DBF circuit, High voltage circuit
	+15V	H. deflection circuit, Rotation circuit
	-15V	Convergence circuit, Corner purity circuit
	+12V	Video circuit, H. deflection circuit
	+8V	Heater
Sub power side	+5V	Microcomputer (MPU)
	P-OFF+5V	VIDEO circuit

Table 1

1.1.2 Rectifying circuit and higher harmonics suppression (active filter) circuit

The AC input voltage is rectified in the full wave mode with the diode bridge in D901 and input to pin 5 of L903. The voltage of both end of C911 is the DC voltage approx. 390VDC boosted with the booster circuit (active filter circuit) composed of IC901, Q901, L903 and D902. The active filter circuit compares the voltage input to pin 1, pin 3 and pin 4 of IC901 and controls Q901 ON/OFF period so that the current flows to L903 be sine-waved. The AC input current is sine-waved in the same phase with the input voltage so as to improve the power factor, and the harmonic current is controlled consequently.

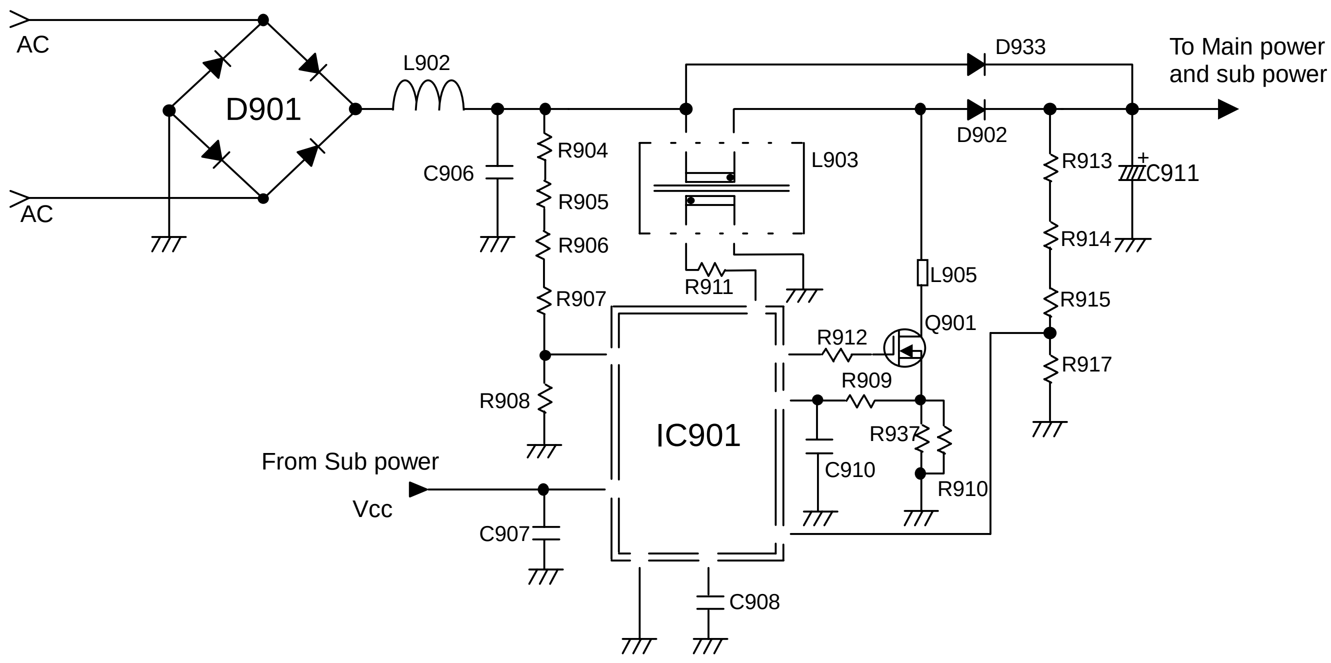


Fig. 1

1.1.3 Sub power circuit

When the power switch is turned ON, the rectified and smoothed DC voltage (AC voltage x $\sqrt{2}$) is supplied to pin 5 of IC903, and is charged to C930 through pin 1. When pin 1 reaches 5.7V, oscillation is started in IC903, and the built-in output FET is put into operation to add the pulse voltage between pin 5 and pin 3 on the primary side of T902. The flyback voltage in proportion to the voltage on the primary side is generated on the secondary side, then the DC voltage is generated with the half-wave rectifier circuit composed of D971 and C971. The DC voltage generated at the secondary side is monitored by IC922 through R976, R977 and R978. This information detected at IC922 is fed back to pin 1 of IC903 via PC902, and the ON period of output FET internal IC903 is controlled to keep the DC voltage on the secondary side constantly. The flyback voltage in proportion to the voltage on the primary side is also generated at pin 2 of T902. The pulse voltage generated at pin 2 of T902 is converted to the DC voltage at D932 and C931, and supplied to pin 8 of IC901 and pin 4 of IC902 via Q902.

1.1.4 Main power circuit

When the P-SUS signal from microcomputer is turned to HI, Q902 is turned to ON, and the voltage approx. +18V is supplied to pin 4 (Vcc terminal) of IC902 from pin 2 of T902.
When the voltage of pin 4 of IC902 reaches approx. +16V, oscillation is started in the circuit, and the built-in output FET is put into operation to add the pulse voltage between pin 5 and pin 2 on the primary side of T901. The flyback voltage generated at the secondary side in proportion to the one in the primary side is rectified at D961, D963, D964, D965 and D967 and smoothed at C961, C963, C964, C965 and C969 to generate the DC voltage. The DC voltage generated at the secondary side is monitored by IC921 through R960, R961, R962 and R985. The information detected at IC921 is fed back to pin 1 of IC902 via PC901, and the ON period of output FET internal IC902 is controlled to keep the DC voltage on the secondary side constantly.

1.1.5 Demagnetizing circuit

When the power is turned ON or the manual demagnetizing function on OSM menu is set to ON, pin 47 of IC102 on the main board is turned to HI, and Q950 and RL901 are also turned ON.
When RL901 is turned ON, the current flows to the demagnetizing coil, however, the demagnetizing current gradually converges with the fever of TH902.

1.1.6 Power management circuit

This monitor carries the power management function. This function is effective only when being connected with the personal computer carrying the power management function.

Mode	H-SYNC	V-SYNC	State	Display
NORMAL	ON	ON	Displaying a picture	Displaying a picture
SUSPENSION	OFF ON OFF	ON OFF OFF	No picture CRT heater is decreased voltage mode (approx. 1.5V)	No raster

The power consumption and the indication of Power-On Indicator for each mode are as follows.

Mode	Power consumption	Power-On Indicator
NORMAL	125W	Green
SUSPEND	2W or less	Orange

The control signal executes the power management function is output from microcomputer IC102. The control signal is composed of two signals, SUSPEND and P-OFF. The operating state of each signal is as follows.

Control signal name	Pin of IC102	Normal	Suspension
SUSPEND	Pin 5	H	L
P-OFF	Pin 42	H	L

1.2 Deflection processor block

1.2.1 Deflection processor (IC601)

Deflection processor IC601 horizontally compensates wise, position and distortion, and vertically controls heights, position and linearity.
IC601 automatically tracks the frequency to output the appropriate horizontal/vertical drive pulse.
IC601 also outputs the horizontal parabola waveform for focus and the waveform for convergence compensation.

1.2.2 Pressure-reduction type horizontal deflection power circuit (IC5C0)

IC5C0 compares the parabola waveform output from pin 64 of IC601 (this waveform controls the horizontal width and distortion) with the sawtooth waveform (this waveform is synchronized with the horizontal frequency) in order to output the +B drive pulse. The +B drive pulse output from pin 9 of IC5C0 will accumulate the 215V energy in T550 during Q5F1 ON period. During Q5F1 OFF period, the accumulated energy will be released, and integrated by T550 and the S-shaped compensation capacitor.
The duty of this drive pulse depends on the DC level of the parabola waveform that is output from IC601.

1.2.3 Horizontal width control circuit

Q550 is controlled by the horizontal drive pulse that is output from IC601. When Q550 is ON, the energy will be accumulated in the horizontal deflection yoke. When Q550 is OFF, the energy will flow into C550. While repeating this operation, horizontal deflection will be carried out.
The collector pulse of Q550 will be subject to voltage division by C590 and C591, and the voltage-divided pulse will be used for switching synchronization of the high-voltage control IC701 and also used as the AFC pulse.
The duty of the +B drive pulse output from pin 9 of IC5C0 will be subject to change in order to control the horizontal width. The parabola waveform output from IC601 is compared with the feedback waveform output from T5C0 to obtain the comparison waveform, and this comparison waveform threshes the sawtooth waveform inside IC5C0 in order to control the duty. If the duty is changed, the rectified voltage of the S-shaped compensation capacitor will be changed, and the horizontal width will be also changed. The vertical parabola waveform is generated inside IC601, and then mixed with the DC level for horizontal width control. After that, the mixed parabola waveform will be output from 64 pin of IC601, and added to IC5C0. This parabola output will be used for compensation of pin-cushion distortion, barrel distortion, trapezoidal distortion, and upper/lower distortion.

1.2.4 Vertical deflection circuit

1.2.4.1 Sawtooth waveform generation, vertical size/position control, and linearity control circuit

If the vertical synchronization signal is input to 42 pin of IC601, the bipolar sawtooth waveform having the same frequency as the input will be output from pins 1 and 11 of IC601. IC601 receives compensation data from the MPU (IC102) to compensate the vertical size, vertical position, vertical raster position, vertical linearity, and vertical linearity balance, and then outputs the compensated sawtooth waveforms from pins 1 and 11. Pin 2 outputs the voltage to show the vertical deflection intermediate point.
The OP amplifier at the next stage outputs a signal to show the difference of the bipolar sawtooth waveform. For this output, the RC low pass filter is adopted to eliminate the digital gradation of the output waveform. In addition, pins 62 and 63 of IC601 will be turned ON during retracing operation in order to prevent deterioration of the linearity and dispersion of scanning lines. Moreover, Q603 and Q604 are switched depending on the vertical frequency in order to improve the linearity.

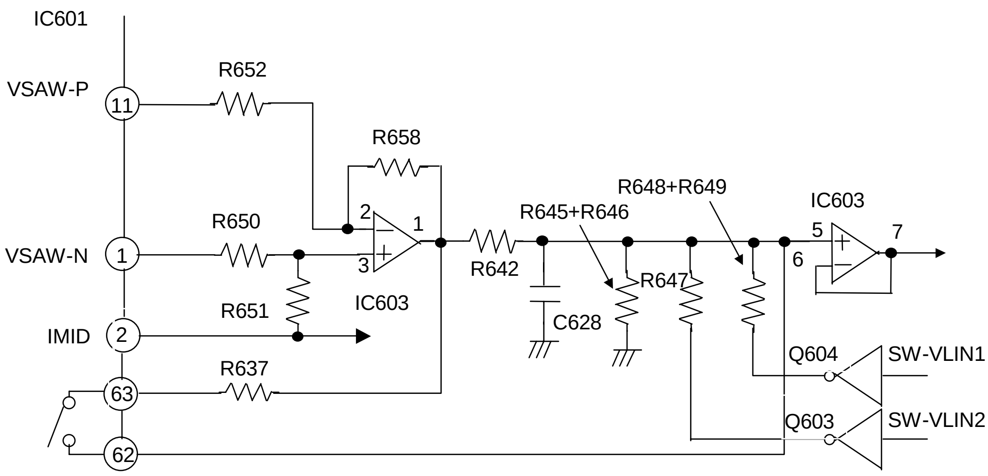


Fig. 2　Vertical sawtooth waveform output circuit

1.2.4.2 Vertical output amplification circuit

A current proportional to the waveform of the voltage input to IC401 will flow to the vertical deflection coil (V-DY). R410 reads out the voltage waveform of the vertical deflection current, and then feeds back it to IC401.

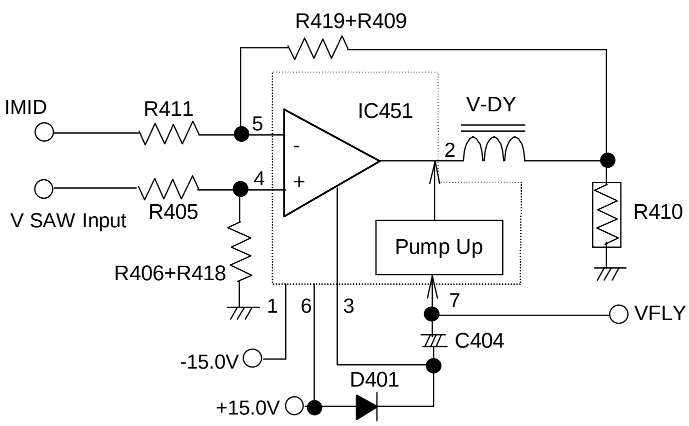


Fig. 3　Vertical output amplifier circuit

1.2.5 High voltage block

The high voltage block applies PWM control system that controls ON/OFF time of the high voltage generation FET.
IC701 is the control IC that executes PWM control.　The pulse voltage generated at Q701 is boosted at T701 (FBT) to generate 27kV.　To keep the high voltage stably, the feedback voltage from pin 10 of T701 is adopted, the control voltage from pin 56 of microcomputer IC102 is returned to pin 5 of IC701 and the pulse wise of PWM output is controlled.　PWM synchronizes with the horizontal frequency.　Trigger pulse for synchronizing is output from the divided collector pulse of the horizontal deflection output TR Q550, and is input to pin 8 of IC701.
For adjustment of high voltage value, the voltage of pin 56 of IC102 is adjusted with the adjustment item HV-ADJ-CAUTION on the OSM menu.

1.2.6 DBF (Dynamic Beam Focus) circuit

The horizontal/vertical DBF voltage is respectively generated and amplified, then synthesized at T7A1. As for the horizontal DBF voltage waveform, the parabola waveform voltage (approx. 0.5Vp-p) is output with IC601, and amplified about 10 times with OP-AMP IC6A2. After that, it is amplified to 50-60Vp-p with Q7B5 (the amplification factor is about 10 times), then it is amplified about 10 times with T7A1.
On the other hand, as for the vertical DBF voltage waveform, the parabola waveform voltage (approx. 1.0Vp-p) is output from IC601. It is amplified about 40 times at Q7A1, and the vertical parabola wave is superposed to the horizontal parabola wave on the secondary side of T7A1, then consequently synthesized. The collector pulse voltage of the high voltage output TR (Q701) rectified at D7A1 and C7A1 is used for the power source of Q7A1. The synthesized DBF waveform is input to pin 12 of T701.

1.3 Video block

1.3.1 Video signal amplifier circuit

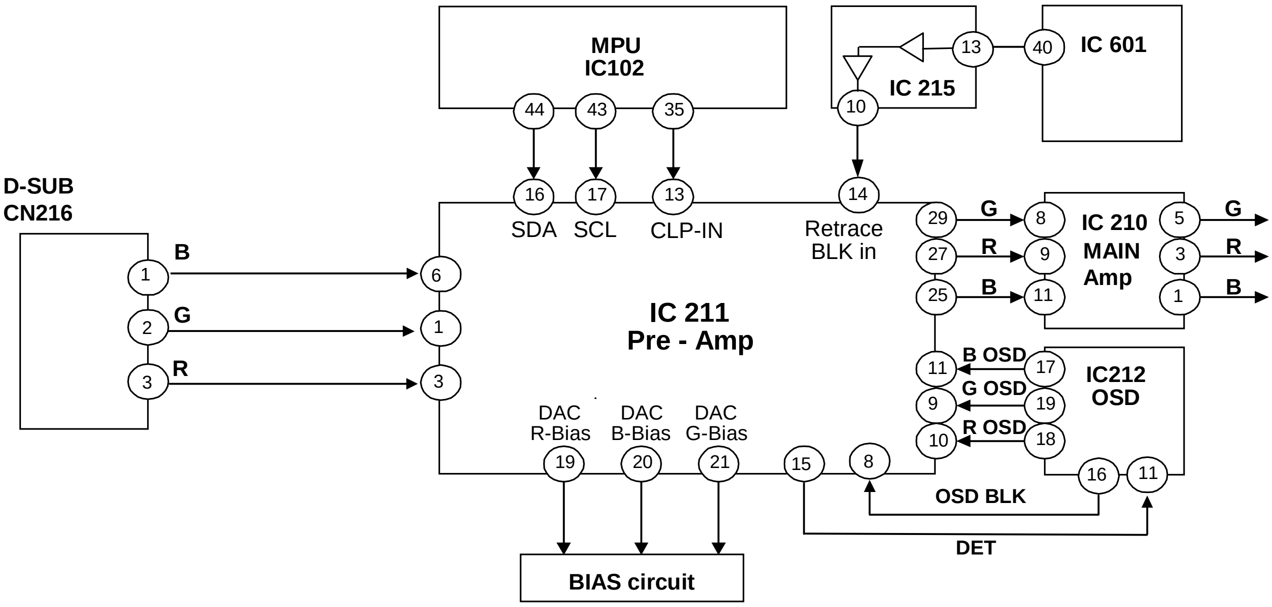


Fig. 4 Video signal amplifier circuit

1.3.1.1 Video clamp

The clamp signal (positive polarity, 3.3 Vo-p) output from pin 35 of the MPU (IC102) is input to pin 13 of IC211. The clamp signal is normally set to the back of the video signal (clamp position of OSM menu: BACK). To correspond to the Sync on Green signal, the clamp signal can be set to the front of the video signal (clamp position of OSM menu: FRONT). If the signal is a separate signal, changing the clamp position of the OSM menu to FRONT or BACK will not change anything.

1.3.1.2 Video blanking

The horizontal/vertical retrace line (blanking) signal (positive polarity, 3.3 Vo-p) output from pin 40 of IC601 is input to pin 13 of IC215. IC215 reverses the polarity and amplifies the waveform (positive polarity, 3.3Vo-p -> negative polarity, 5.0Vo-p), and then reverses the polarity again (negative polarity, 5.0Vo-p -> positive polarity, 5.0Vo-p) to output the blanking signal. This blanking signal is input to pin 14 of IC211 to perform blanking operation during horizontal/vertical retracing operation.
To perform image blanking at switching the signal mode or at turning ON or OFF the power, the contrast and the brightness will be set to MINIMUM.

1.3.1.3 Video mixing/amplifying

IC211 mixes the video signal with the OSM signal (G, R, and B signals of pins 9, 10, and 11) and with the video blanking signal described in Sec. 1.3.1.2. I2C bus (pins 16 and 17 of SCL and SDA) fixes the black level of the mixed video signal to 1.8V, and amplifies the mixed video signal (0.7Vp-p -> approx. 2.6Vp-p). After that, the B, R, and G signals are output from pins 25, 27, and 29, respectively. The video signal output from IC211 is input to IC210, where the signal is amplified (approx. 2.6Vp-p -> approx. 36Vp-p), and the black level is fixed to 67V. After that, the B, R, and G signals are respectively output from pins 1, 3, and 5.

1.3.1.4 Control of contrast and white balance

The MPU (IC102) sends the 8-bit contrast/white balance control data to IC211 with I2C bus (SCL, SDA line). The contrast data simultaneously control 3 channels to simultaneously control the gains of the R, G, and B, and the white balance data respectively controls the gains of the R, G, and B.

1.3.2 Cut-off control circuit

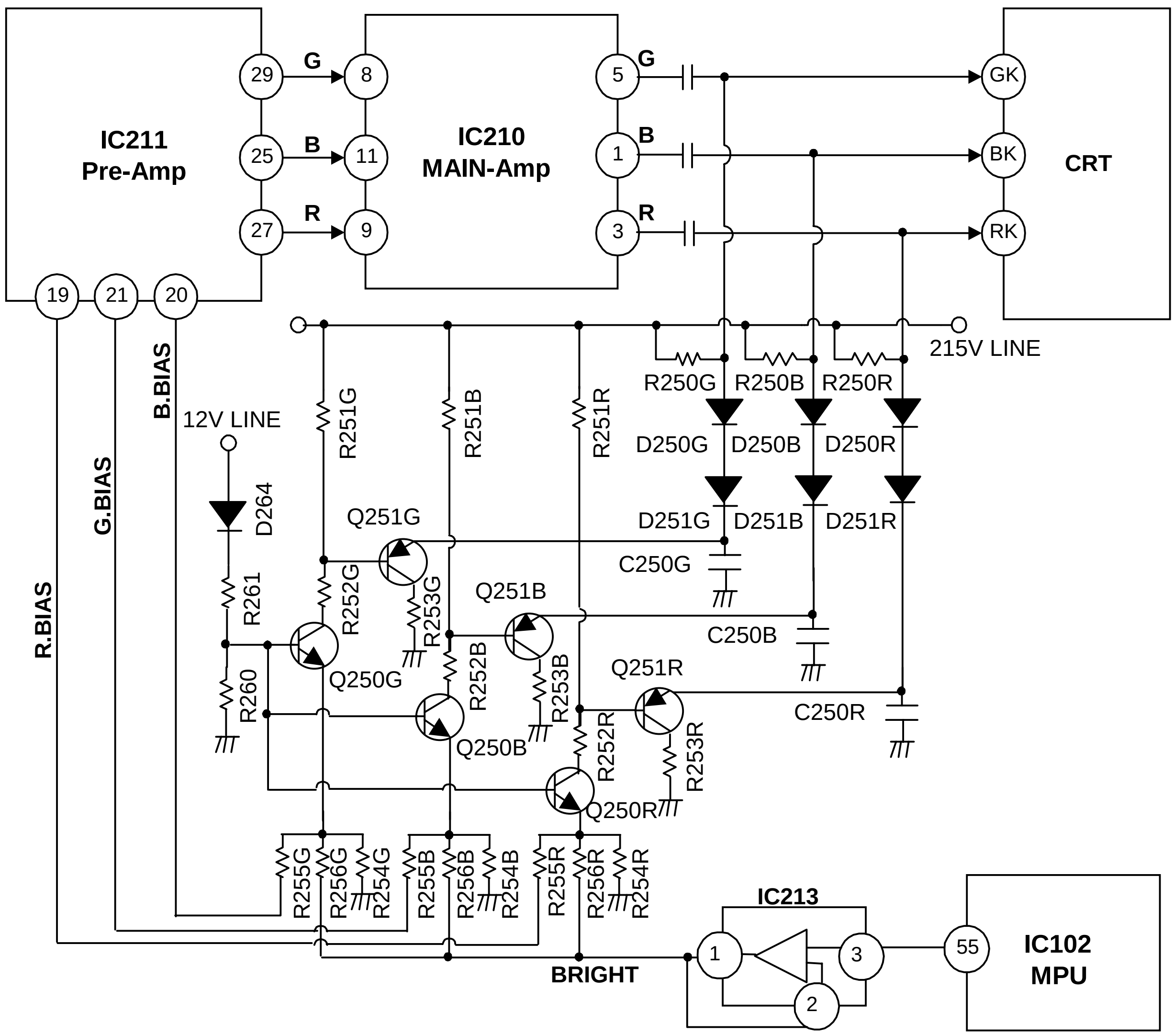


Fig. 5   Cut-off control circuit

The cut-off control circuit consists of Q250R, Q250G, Q250B, Q251R, Q251G, and Q251B, and simultaneously adjusts 3 colors (brightness), or individually adjusts 3 colors (biases of R, G, and B). The microcomputer controls both types of adjustment.

1.3.2.1 Control of brightness

To simultaneously adjust 3 colors (brightness), the DAC voltage (0 to 5V, variable) line of microcomputer pin 55 is connected to the emitters of Q250R, Q250G, and Q250B via IC213. This connection enables simultaneous control of three TR collector currents and adjustment of the brightness.

1.3.2.2 Control of BIAS

To individually adjust 3 colors (biases of R, G, and B), the DAC output (1.5 to 5.5V, variable) lines (pins 19, 20, and 21 of IC211) are respectively connected to the emitters of Q250R, Q250G, and Q250B via I2C bus of the microcomputer. This connection enables respective control of three TR collector currents and adjustment of biases of the R, G, and B.

1.3.3 OSM (On Screen Manager)

IC212 is the OSM (On-Screen Manager), and displays the screens for screen adjustment, etc. The data to be displayed on the OSM screens is sent to the MPU (IC102) via I2C bus.

1.3.4 Asset circuit

If the monitor power is turned OFF, 5V power will be supplied to pin 8 of EEPROM (IC218) from the PC via pin 9 of CN216, and the data stored in the EEPROM (IC218) can be read out from I2C bus.

1.3.5 AUTO-SIZE function

The AUTO-SIZE function detects the phase data of RGB OR signal (output to pin 11 of OSM (IC212) from pin 15 of AMP (IC211) from H-OSM and V-S signals input to pins 5 and 16 of IC212 in order to automatically adjust the screen to the optimum width and position.
Using the OSM, select AUTO SIZE ADJUST, and then press (+) button to perform automatic size adjustment.

1.3.6 SB MODE (Super Bright Mode) function

1.3.6.1 Adjustment item/operating function in selecting SB Mode

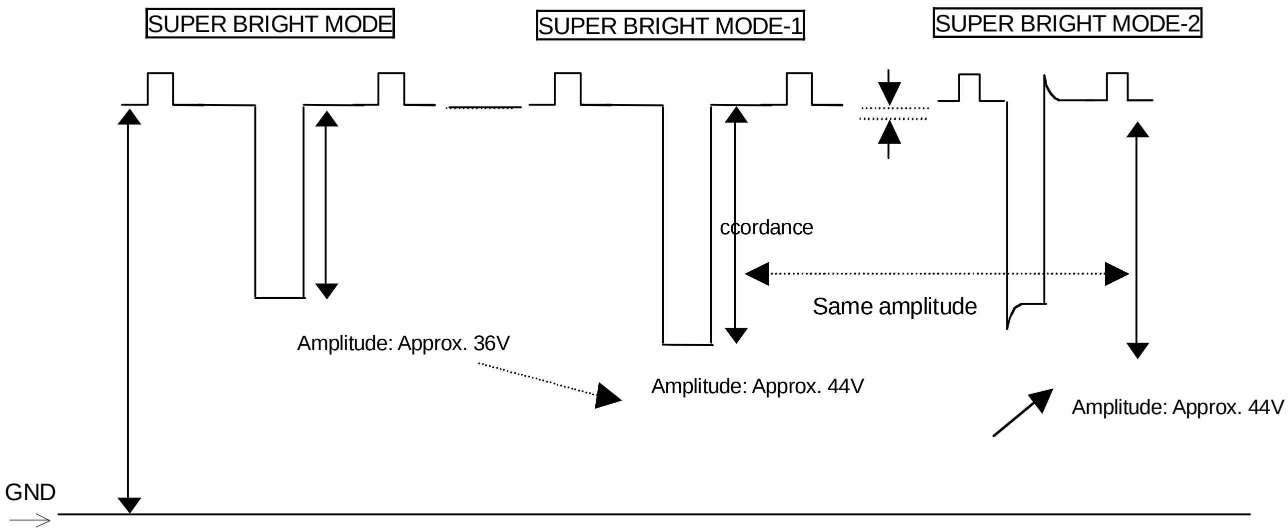
→SUPER BRIGHT MODE OFF (in factory adjustment state)
↓
SUPER BRIGHT MODE-1 ON (PICTURE)
↓
SUPER BRIGHT MODE-2 ON (MOVIE)
↓

	User adjustment items related to luminance/color coordination				
	Adjustment of brightness	Adjustment of contrast	Color mode selection	Color temperature selection	Individual GAIN adjustment
SUPER BRIGHT MODE OFF	Adjustable (*1)	Adjustable (*1)	Selectable	Selectable (*2)	Adjustable (*4)
SUPER BRIGHT MODE-1 ON	Adjustable (*1)	Adjustable (*1)	Not-selectable	Selectable (*2)	Not-adjustable
SUPER BRIGHT MODE-2 ON	Adjustable (*1)	Adjustable (*1)	Not-selectable	Selectable (*2)	Not-adjustable

(*1): Brightness and contrast are common among three display mode.
(*2): For color temperature, the adjustment value is memorized in every display mode.

	Back raster luminance	GAIN UP	compensation	Sharpness
SUPER BRIGHT MODE OFF	Normal	Normal	---	---
SUPER BRIGHT MODE-1 ON	Normal	UP	Presence	---
SUPER BRIGHT MODE-2 ON	UP	UP	Presence	Presence

1.3.6.2 Circuit (cathode) operation in selecting SB Mode [Window pattern]



1.3.6.3 SB Mode setting data and control method

(OSM FACT3)	Data name	Data (hex)	
Setting of back raster luminance	SBBR1	0	BRT UP value in SUPER BRIGHT MODE-1 ON "0"=No UP
	SBBR2	32	BRT UP value in SUPER BRIGHT MODE-2 ON
Setting of GAIN UP	SBCN1	3C	Amplified value in SUPER BRIGHT MODE-1 ON (see the following formula)
	SBCN2	3C	Amplified value in SUPER BRIGHT MODE-2 ON (see the following formula)

GAIN UP formula = GAIN adjustment value (hex)(*3) x {1+ (Data (hex) of SBCN1 or SBCN2)/FF (hex) }

(*3): GAIN adjustment value is the following data (in OSM FACT3).

9300K	R-GN1	G-GN1	B-GN1
6500K	R-GN2	G-GN2	B-GN2
5000K	R-GN3	G-GN3	B-GN3

(*4): When the SUPER BRIGHT MODE-1 or MODE-2 is ON, the GAIN cannot be adjusted as shown in the table in Sec. 1.3.6.1 "Adjustment item/operating function in selecting SB Mode". However, when the SUPER BRIGHT MODE is OFF, the MAX GAIN value calculated with the following formula will be written in the following EEP address so that the GAIN value cannot be increased above that of the SUPER BRIGHT MODE-1 and MODE-2 ON status.
MAX GAIN = Maximum value (hex) for R/G/B GAIN adjustment (Note 5) x {1 + (SBCN1 or SBCN2 data (hex))/FF (hex)}

(*5): R/G/B GAIN MAX value is the maximum one among GAIN adjustment value mentioned (*3) above.

EEP address (hex)

	R	G	B
MAX GAIN	89	8a	8b

* Every R/G/B MAX GAIN data applied to the address listed above table are totally same.

In case of repair, after CRT, Pre-AMP (IC211), MAIN-AMP (IC210), etc. are replaced and the luminance/color coordination is adjusted, the MAX GAIN value mentioned above should be rewritten.

1.3.7 CONSTANT BRIGHTNESS function

The brightness and color coordination of the screen will be deteriorated due to secular deterioration of the

CRT. The CONSTANT BRIGHTNESS function, however, will recover the deteriorated brightness close to the initial level (level ensured at outgoing the factory).
If the CONSTANT BRIGHTNESS function is activated, operation will be performed at 106kHz horizontally and at 85Hz vertically while ignoring the input signal, and the OSM-IC (IC212) will output the reference image signal. In this condition, R744 detects the beam current flowing to pin 9 of the flyback transformer T701. This beam current is inverted and amplified by IC703, and then converted into a voltage value by the current/voltage conversion circuit. After that, the converted voltage value will be input to the A/D converter (pin 27 of IC102 (microcomputer)). To individually detect the beam current values of 3 colors (R, G, and B), the desired color only will be brightened by increasing the cut-off voltages of the other 2 colors. After obtaining the beam current values of 3 colors in this way, the obtained beam current values will be compared with the beam current values used for factory adjustment (beam current values stored in the EEPROM). After that, the cut-off voltage values of 3 colors (R, G, and B) will be adjusted so that the beam current values close to the factory adjustment values can be obtained. In this way, the cut-off conditions of the CRT will be recovered close to the factory adjustment level.
In addition, if the CONSTANT BRIGHTNESS function is activated, the C_TIME_SEL signal input to the base of Q704 will be set to the low level, Q704 is turned OFF, and the bias voltage will be applied to pin 5 of IC703. As a result, voltage proportional to the beam current value will be output from pin 7 of IC703. By the way, difference in the flyback transformer or the CRT may cause difference in the beam current. To eliminate such difference in the beam current, the DAC voltage (commonly used for the 6H-DC signal) can adjust the bias voltage input to pin 5 of IC703 described above. During normal operation, the C_TIME_SEL signal is set to the high level, Q704 is turned ON, and pin 5 of IC703 is grounded via the GND line so that the output of IC703 pin 7 can be kept at the low level. The signal output from pin 7 of IC703 is added to ABL signal with MD717 (Diode). When the CONSTANT BRIGHTNESS function is activated, the ABL signal is input to pin 27 of IC102 as the beam current signal.

1.4 CRT compensation block

1.4.1 Rotation circuit

The rotation circuit is a circuit to compensate the picture inclination caused by the earth magnetism by letting DC current flow to the rotation coil wound on the front side of DY for adjustment. It is controlled to 0 to 5V with the reference of 2.5V by IC102 pin 45 (PWM_DAC), and DC current of +/-100mA (max) is made to flow to the rotation coil by IC804 pin 2.

1.4.2 Corner purity circuit

The corner purity circuit is a circuit to compensate for the color shade and color deviation of the picture corner. On the rear side of CRT, it is adjusted by DC current flowing to the corner purity coils installed in the four corners on the display surface.
The compensation circuit is composed of the following three functions of (1) User adjustment (OSM display), (2) Aging variation compensation and (3) High/low temperature drift compensation.

(1) User adjustment (OSM display)
The user causes DC current of +/-120mA (max) to flow to the purity coil of each corner according to the value displayed on OSM.

(2) Aging variation compensation
As the electronic beam collides with the aperture grille, it is thermally expanded and contracted. The thermal expansion/contraction is varied according to the elapse of the power ON/OFF time of the monitor. The color shade and deviation of the picture corner thus generated are automatically adjusted.
The voltage of the beam current supply pin (T701 pin 9) is detected with R723/R724, and the voltage that detects the time elapse of the power ON/OFF of the monitor is read from the CR charge (integration) circuit composed of C723 and R738, and CR discharge (integration) circuit composed of C723 and R737 through IC702 (buffer amplifier) by IC102 pin 26 (CPU_ADC), then, the DC current of +/-19mA (max) flows to the purity coil on each corner according to the specified control program.

(3) High/low temperature drift compensation
The front panel (glass) is thermally expanded and contracted as the temperature varies in the installation environments of the monitor. The color shade and deviation of the picture corner are automatically adjusted. The voltage that detects the temperature variation of the installation environments of the monitor is read from the environment temperature detection circuit composed of TH100 (thermistor) arranged near the front panel (glass) by IC102 pin 25 (CPU_ADC), and DC current of +/-13mA (max) is made to flow to the purity coil on each corner according to the specified control

program.

1.4.2.1 Corner purity circuit operation

<TL: Upper left corner>
Pin 50 (PWM_DAC) of IC102 controls the TL in the range of 0 to 5V while regarding 2.5V as the reference voltage, and the DC current of the above value will flow from pin 2 of IC803 to the upper left corner purity coil.

<TR: Upper right corner>
Pin 49 (PWM_DAC) of IC102 controls the TR in the range of 0 to 5V while regarding 2.5V as the reference voltage, and the DC current of the above value will flow from pin 8 of IC803 to the upper right corner purity coil.

<BL: Lower left corner>
Pin 52 (PWM_DAC) of IC102 controls the BL in the range of 0 to 5V while regarding 2.5V as the reference voltage, and the DC current of the above value will flow from pin 2 of IC801 to the lower left corner purity coil.

<BR: Lower right corner>
Pin 51 (PWM_DAC) of IC102 controls the BR in the range of 0 to 5V while regarding 2.5V as the reference voltage, and the DC current of the above value will flow from pin 8 of IC801 to the lower right corner purity coil.

1.4.3 Digital dynamic convergence clear (DDCC) circuit

In the digital dynamic convergence clear (hereafter called DDCC) circuit, the convergence compensating current waveform is produced and amplified, and the convergence is compensated by the compensation current flowing to the sub yoke that is installed as the rear unit of the deflection yoke.
Though the principle of the convergence compensation with the sub yoke is same as the CP ring, the CP ring is used for the static variation with the parallel movement in the whole picture in the uniform magnetic field with the permanent magnet but the sub yoke is used for dynamic variation that compensates a desired position on the picture by controlling the current waveform that flows to the coil of the electric magnet. (See Fig. 7)

1.4.3.1 Production of compensation current waveform

There are 30 kinds of compensation elements, and they are programmed in IC601 one by one using the function. Inputting the compensation coefficient into the function controls the amplitude of the current.

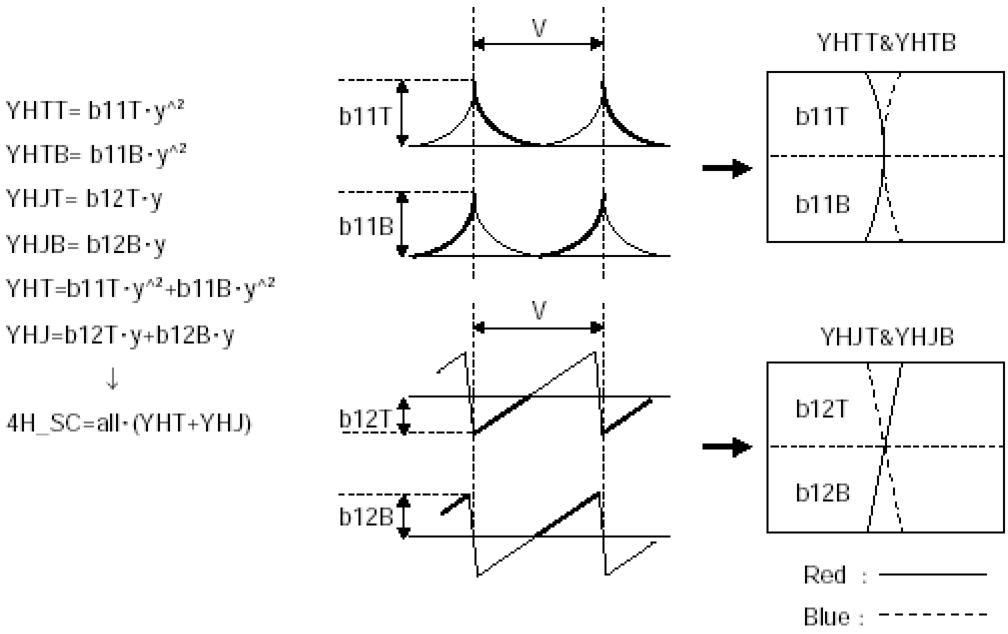


Fig. 6 DDCC compensation image

Examples of the functions and current waveform/compensation operation of YH (YHTT, THTB, YHJT, YHJB) are shown as follows.
In the above formulas, b11T, b11B, b12T and b12B express the compensation coefficients, and y and y^2 express the primary and secondary functions of the vertical frequencies.
The other parts except the compensation coefficients are programmed, and desired amplitudes (= compensation amount) are gained by varying the coefficients.
YHTT and YHTB compensate the upper and lower parts of the picture of the characteristic components of their DYs to compensate the upper and lower parts of the picture of the axis deviation component. The component gained by adding YHT and YHJ is multiplied by the offset compensation coefficient a11. The resultant component is regarded as 4H_SC, and is output from IC601 pin 61.

1.4.3.2 Waveform, and operation on the picture

The case in which the currents flow through 4H coils of the sub yoke is explained. Regarding YHT (secondary function in the vertical frequency), in case of Fig. 6 as an example, the current is large in the same direction at the start (upper end of the picture) and the end (lower end of the picture) of the vertical frequency, and is zeroed on the X axis of the picture. Therefore, the magnetic field that is proportional to it is generated, and RED and BLUE vary in the same direction only at the upper and lower ends of the picture.
As aforementioned, YHT can be independently controlled at the upper part (b11t · y^2) and lower part (b11B · y^2).
Moreover, regarding YHJ (primary function in the vertical frequency), if the flowing direction of the current is opposite at the start (upper end of the picture) and the end (lower end of the picture) of the vertical frequency as an example, RED and BLUE vary in the opposite direction only at the upper and lower ends of the picture. Making the current flow to the 4V coil can do compensation in the vertical direction.
Fig. 8 (a) and (b) shows the image of each adjustment item of the DDCC adjustment.

1.4.3.3 Adjustment method

Before the adjustment with the compensation circuit, it is necessary that they are properly adjusted at the center (H-STATIC and V-STATIC), on the X axis (XH slider, B-Bow 4P, XV differential coil) and on the Y axis (YH volume, YV volume).
Though DC current is superimposed on the sub yoke, H-STATIC and V-STATIC are pushed to the greatest possible extent by the adjustment with CP ring in order to reduce the stress of the driver IC8A1 (STK391-110).
Moreover, since 4H and 4V coils alone are installed on the chassis, it is first necessary that the convergence of RED, BLUE and GREEN (6H, 6V) satisfy the specifications for the performance of ITC (CRT&DY).
As the adjustment procedure, the adjustment values of 30 elements are not respectively zeroed but they are adjusted to nearest to zero with a total balance in good order.
In other words, the balance (compromise) adjustment with each adjustment item is applied.

The correspondence of the names of DDCC adjustment mode to the coefficients of all 30 elements is shown below.

<Factory mode>

4H Coil	b11T	YHTT	y^2	b11B	YHTB	y^2	b12T	YHJT	y	b12B	YHJB	y
	b21L	XHL	x^2	b21R	XHR	x^2						
	b31TL	S3HTL	x^2 · -(y^3+y^4+y^5+y^6)	b31TR	S3HTR	x^2 · -(-y^3+y^4+y^5+y^6)	b31BL	S3HBL	x^2 · -(-y^3+y^4-y^5+y^6)	b31BR	S3HBR	x^2 · -(-y^3+y^4-y^5+y^6)
	b41TL	PQHTL	x^2 · y^4	b41TR	PQHTR	x^2 · y^4	b41BL	PQHBL	x^2 · y^4	b41BR	PQHBR	x^2 · y^4
4V Coil	c11T	YVTT	y^2	c11B	YVTB	y^2	c12T	YVJT	y	c12B	YVJB	y
	c21L	XVL	x^2	c21R	XVR	x^2						
	c31TL	S3VTL	x^2 · -(y^3+y^4+y^5+y^6)	c31TR	S3VTR	x^2 · -(-y^3+y^4+y^5+y^6)	c31BL	S3VBL	x^2 · -(-y^3+y^4-y^5+y^6)	c31BR	S3VBR	x^2 · -(-y^3+y^4-y^5+y^6)
	c41TL	PQVTL	x^2 · y^4	c41TR	PQVTR	x^2 · y^4	c41BL	PQVBL	x^2 · y^4	c41BR	PQVBR	x^2 · y^4

<User & Factory mode>

4H Coil	a11	H-CONVERGENCE	DC
4V Coil	a12	V-CONVERGENCE	DC

1.4.3.4 Block diagram

Fig. 9 shows the block diagram of the DDCC circuit.
The components 4H_DC (pin 6), 4H_SC (pin 61), 4V_DC (pin 8) and 4V_SC (pin 60) supplied from IC601 to 4H-Coil and 4V-Coil are output, the dynamic component (4H_DC, 4V_DC) is amplified with IC6A2, and the static component (4H_SC, 4V_SC) is amplified with IC6A3.
DDC (pin 7) output from IC601 and DEFL_+3.3V (pin 3) output from IC602 are respectively the reference

voltage of Op-Amp (IC6A2) that amplifies the above dynamic component (4H_DC, 4V_DC) and the reference voltage of Op-Amp (IC6A3) that amplifies the static component (4H_SC, 4V_SC).
On each of 4H and 4V, the waveform added with the dynamic component and static component is input to IC8A1 pin 3 and pin 4, and it allows the specified current to flow to each convergence compensation coil.

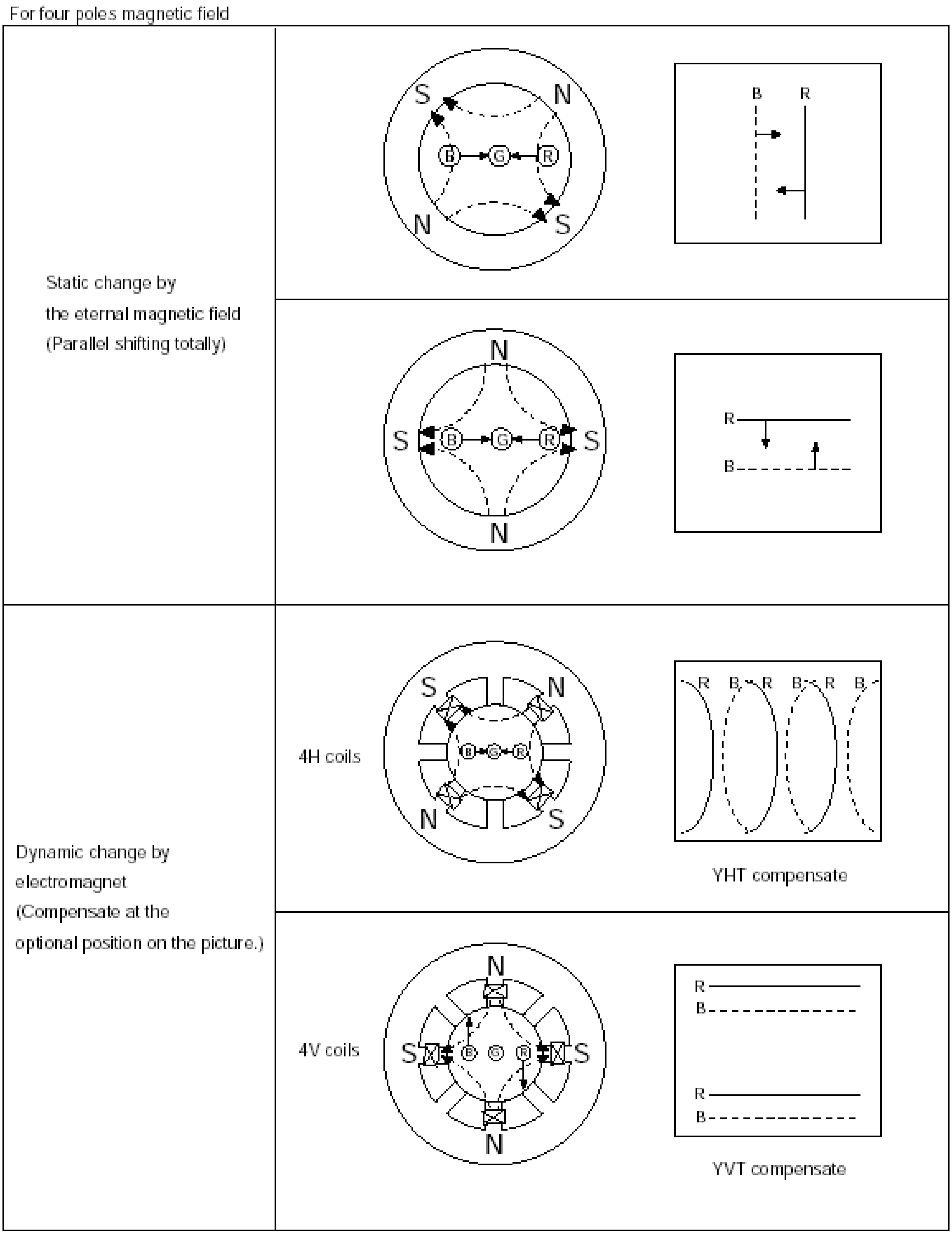


Fig. 7 The principle of DDCC compensation

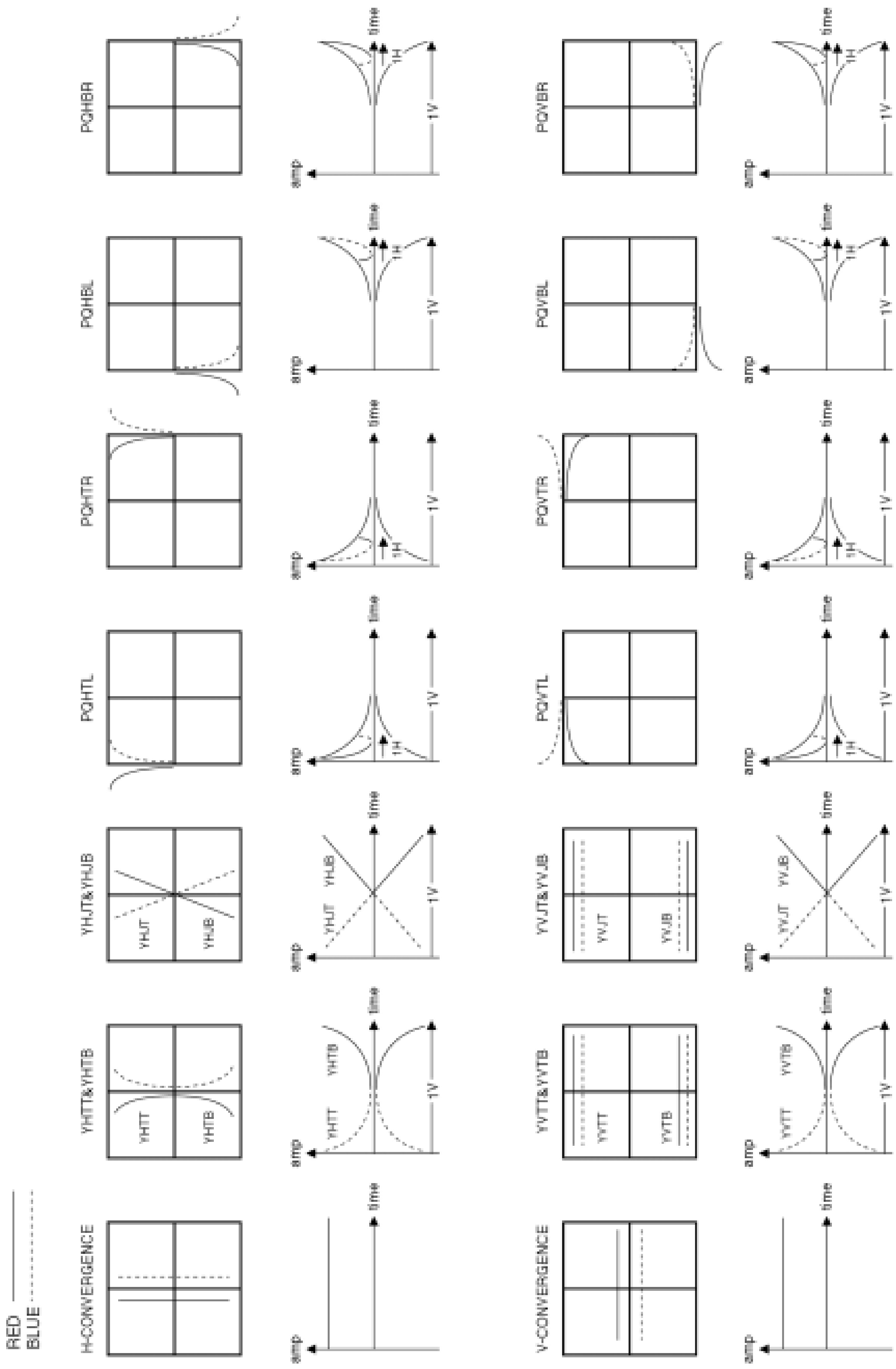


Fig. 8 (a) DDCC adjustment item

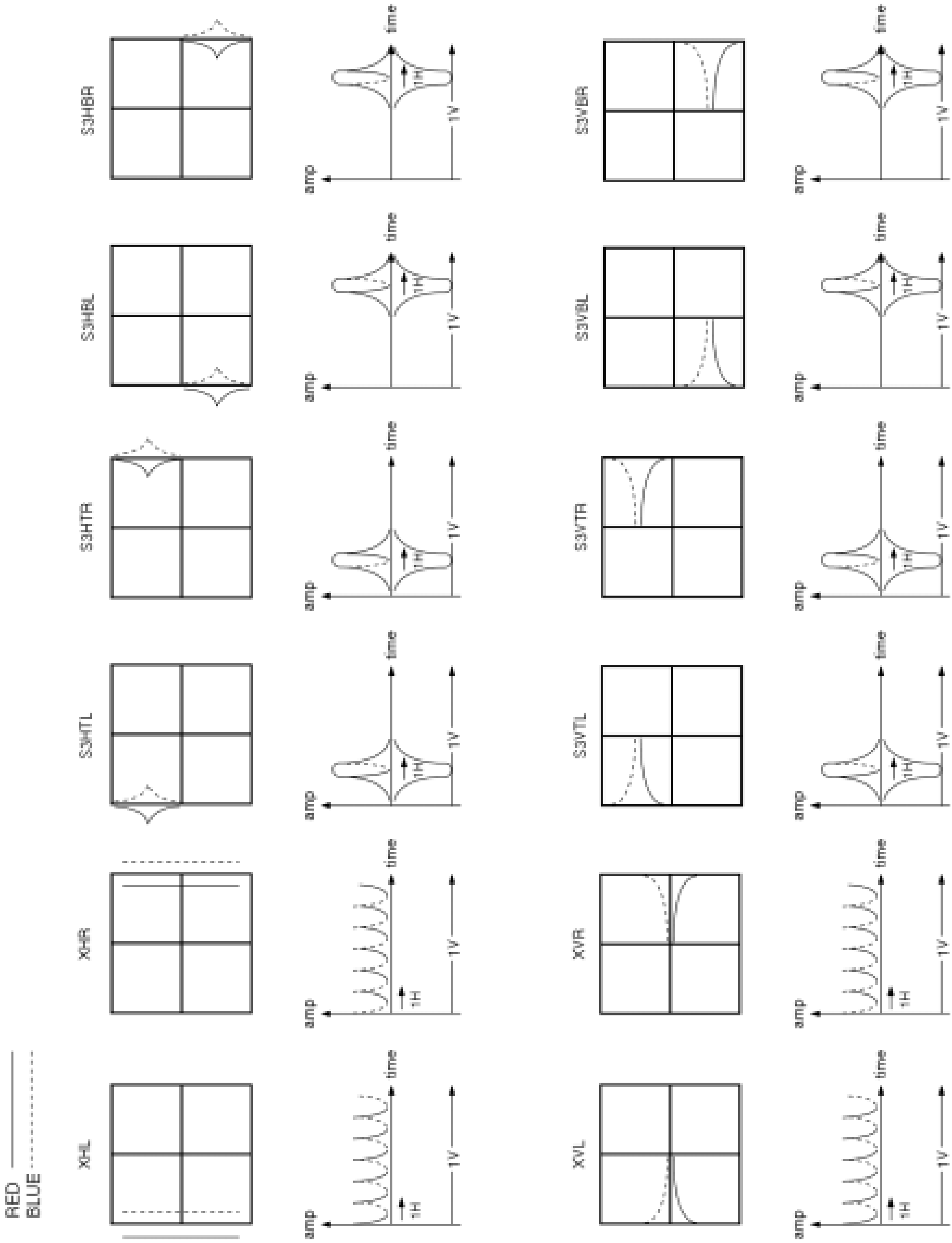


Fig. 8 (b) DDCC adjustment item

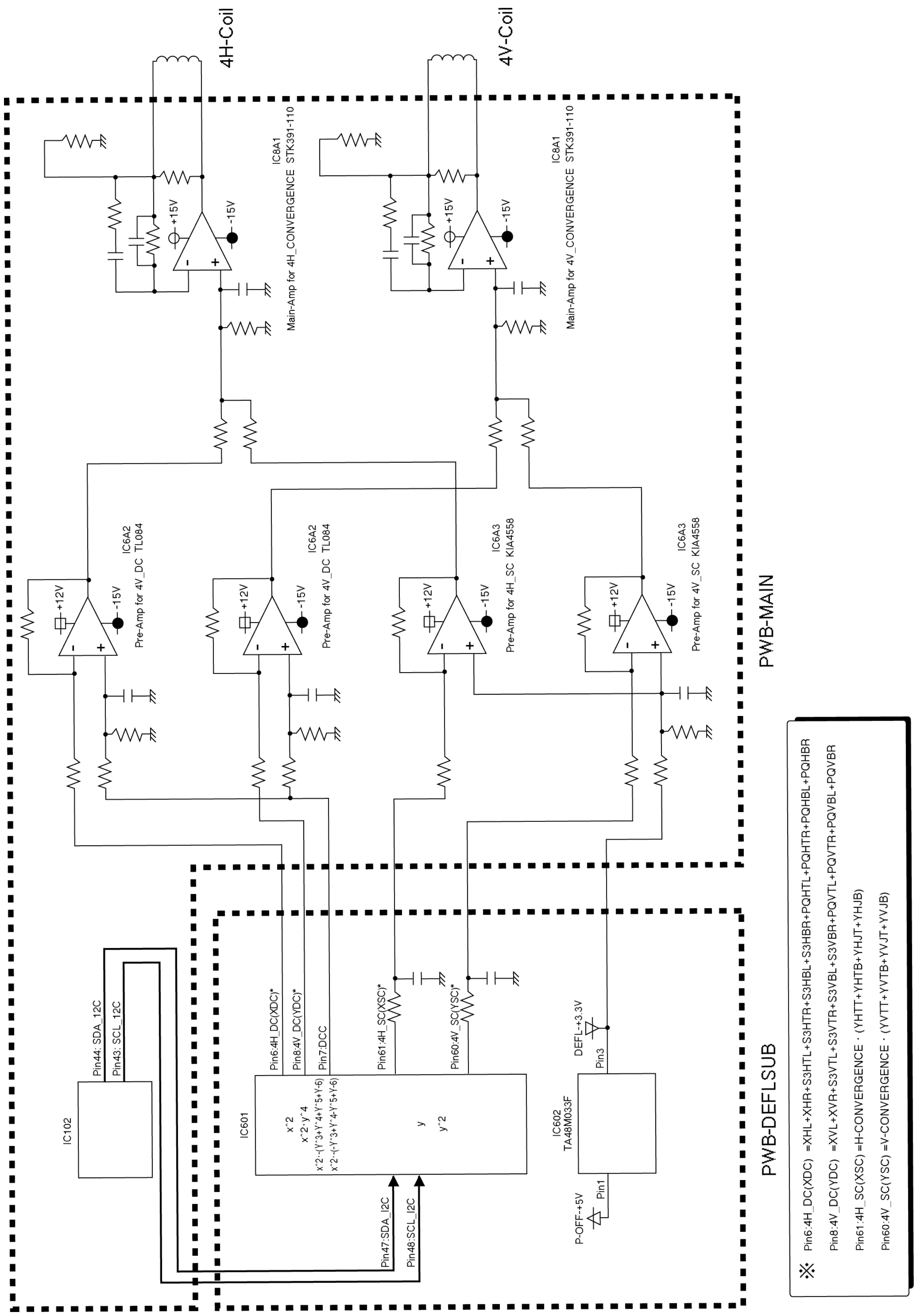


Fig. 9 DDCC circuit diagram

1.5 Control block

1.5.1 Function of control circuit

The control block is mainly on MAIN board and DEFL-SUB board, and the function is as follows.
(1) Auto-tracking
(2) Control of picture size, distortion and position
(3) Adjustment data memory
(4) Sync. signal detection
(5) OSM control
(6) Video pre-amp control and clamp pulse position control
(7) Power ON/OFF control
(8) Heater voltage control
(9) DDC 1 / 2B / 2Bi
(10) Operating time display

The control block is composed of the following four components.

(1) Microcomputer:	IC102 (MAIN board)
(2) OSM IC:	IC212 (VIDEO board)
(3) EEPROM:	IC104 (MAIN board)
(4) Sync. signal input:	IC215 (VIDEO board)

1.5.2 Auto-tracking process

The microcomputer (IC102) calculates the frequency of the sync. signal input and outputs the distortion compensation data corresponding to the input signal timing to the deflection IC (IC600).
Control with IC600 is carried out via I2C bus.

1.5.3 EEPROM

The capacity of the EEPROM (IC104) is 32 kilobits (4 kilobytes). The factory adjustment data, user adjustment data, and EDID data are stored in the EEPROM.
Up to 9 items can be stored as the factory preset data, and up to 16 items can be stored as the user preset data. Regarding the factory preset timing, if the user reset the memory, the factory adjustment data will be called up.
The EDID data is stored in the last 128-byte area.

1.5.4 On-Screen-Manager (OSM) controller

The On-Screen-Manager (OSM) controller IC IC212 displays the picture used for picture adjustment and so on. OSM display data is sent from the microcomputer (IC102) via I2C bus.

1.5.5 Heater voltage control

In the normally ON status, the heater voltage is supplied from the +8V line of the main power circuit. Heater resistor R203H connected in series adjusts this supplied voltage to +6.15V (typ) (rated voltage for the CRT) before application. In the suspend mode, the sub-power circuit applies the voltage so that the screen can be instantaneously recovered. (In the suspend mode, the heater voltage is low compared with that of the normally ON status.)

1.5.6 Protection circuit operation

This monitor can detect the following problems, and can stop the monitor operation after detection of a problem. If the protector function is activated, the Power-On Indicator (LED) will flicker so that you can localize the activated protector.

1.5.6.1 X-ray protector

The CRT monitor radiates X-rays, and exposure to too much radiation is very dangerous. For this reason, the CRT monitor incorporates an X-ray protector. If the high voltage value rises above the specified value, the protector will automatically stop applying the high voltage. For this model, the X-ray protector activation point is set to 31.0kV (entirely black screen).
To disable the X-ray protector for the reason of repair, etc., set the monitor in the factory mode.

1.5.6.2 High voltage data error detection

Important safety data, such as the high voltage adjustment value and the X-ray protector activation voltage, are stored in the EEPROM. For each safety data, there is backup data. If both data values differ from each other, the monitor will enter the power saving mode (the high voltage will not be applied).

1.5.6.3 Beam current protector

If too much beam current flows (1.5mA or more), "H" will be input to the ABL terminal (pin 27 of the microcomputer (IC102)). From this terminal, the microcomputer will detect overflow of the beam current, and will set the monitor in the power saving mode.

1.5.6.4 Power-On Indicator (LED) flickering pattern in each protector operating

If a protector is activated, the Power-On Indicator (LED) will flicker as shown below to indicate the activated protector (to show the cause of the problem).

Table 2　Power-On Indicator (LED) flickering pattern in each protector operating

Protector state	Power-On Indicator (LED) state	
	Short (0.5s) lighting times	Long (2s) lighting times
X-ray protector	1	1
High voltage circuit latch detection	2	1
Data protector	3	1
Beam protector	5	1
+B short-circuit	7	1

1.5.6.5 Operating time

If "DIAGNOSIS" is selected from the menu in the factory mode, the monitor operation time will appear. 0.5 hours will be added to this value every 30 minutes.

P: Indicates the power-on time (including the operation time in the power saving mode).
K: Indicates the heater power-on time.

1.5.6.6 The DDC communication

The microcomputer carries out the DDC communication. For this communication, the microcomputer reads out the EDID data from the EEPROM, and stores the data in the RAM. When receiving a request from the PC, the microcomputer will output the data from pins 8 and 11.

1.5.6.7 Microcomputer pin assignment

#	PORT	ASSIGN	I/O	FUNCTION	#	PORT	ASSIGN	I/O	FUNCTION
1	H_LOCK	IRQ2/P40	I	H_UNLOCK detection	64	CS8	P37	O	CS switching 8
2	USB-SPARK USB-RESET	IRQ1/P41	I/O	For FLASH writing	63	CS7	P36	O	CS switching 7
3	INPUT SEL	IRQ0/P42	O	Power cut detection	62	CS6	P35	O	CS switching 6
4	HSK	RD/P43	O	SOA output	61	CS5	P34	O	CS switching 5
5	SUSPEND	WR/P44	O	Suspend	60	CS4	P33	O	CS switching 4
6	C TIME SEL	IOS/AS/P45	O		59	CS3	P32	O	CS switching 3
7	OPTION	EXCL/o/P46	I	(available as input port)	58	CS2	P31	O	CS switching 2
8	DDC_DATA	SDA0/WAIT	I/O	DDC data	57	CS1	P30	O	CS switching 1
9	FLASH_TX	TxD0/P50	O	PZTAT	56	HVADJ	P10/PWMX0	P	HVADJ
10	BEAM/SHORT	RxD0/P50	I	Beam protector	55	BRIGHTNESS	P11/PWMX1	P	Brightness
11	DDC_SCL	SCL0/SCK0	I/O	DDC clock	54	SW LIN2	P12/PW2	O	SW LIN2
12	RESET	RES	I	Reset	53	SW LIN1	P13/PW3	O	SW LIN1
13	NMI	MNI	I	NMI	52	PURITY_BL	P14/PW4	P	Corner purity BL
14	(+) 5V	Vcc			51	PURITY_BR	P15/PW5	P	Corner purity BR
15	STBY	STBY	I		50	PURITY_TL	P16/PW6	P	Corner purity TL
16	GND	GND			49	PURITY_TR	P17/PW7	P	Corner purity TR
17	X'TAL	XTAL			48	GND	Vss		
18	X'TAL	EXTAL			47	DEGAUSS	P20/PW8	O	DEGAUSS
19	MODE SW1	SW1		Mode setting	46	V_CANCEL	P21/PW9	P	V. magnetic field cancel output
20	MODE SW2	SW2		Mode setting	45	ROTATION	P22/PW10	P	Rotation
21	GND	AVss			44	IIC_SDA	SDA1	I/O	Internal IIC data
22	KEY1	AN0/P70	A/D	Key input	43	IIC_SCL	SCL1	I/O	Internal IIC clock
23	KEY2	AN1/P71	A/D	Key input	42	P OFF	P25/PW13	O	POWER OFF
24	X RAY PRO	AN2/P72	A/D	X-ray protector	41	LIN PWM1	P26/PW14	P	H. linearity
25	TEMP	AN3/P73	A/D	Temp. detection	40	6H	P27/PW15	P	6H
26	BEAM TIME	AN4/P74	A/D	Time detection	39	Vcc	Vcc		
27	ABL/C TIME	AN4/P75	A/D	Heater voltage detection	38	Hsync OUT	P67/HSYNCO	O	H. sync. output
28	EW_SENSE	AN6/P76	A/D	H. magnetic field detection	37	SOG IN	P66/CSYNCI	I	SYNC ON G input
29	SN_SENSE	AN7/P77	A/D	V. magnetic field detection	36	HSYNC IN	P65/HSYNCI	I	H. sync. input
30	Vcc	AVcc			35	CLAMP OUT	P64/CLAMPO	O	CLAMP OUT
31	LED	HFBACK/P60	O	LED output	34	HSYNC SEL	P63/VFBACKI	O	HSYNC SEL
32	VSYNC OUT	VSYNCO/P61	O	V. sync. output	33	VSYNC IN	V_SYNCI	I	V. sync. input

1.6 Safety protection circuit and X-ray protection circuit

1.6.1 X-ray protection circuit

This circuit prevents X-ray radiation from exceeding the dangerous level due to the abnormal rise of high voltage.
Do not modify the high voltage circuit and the safety protection circuit.
The upper limit of the high voltage value and the beam current value are determined by the X-ray radiation upper limit curve of CRT.
In the X-ray protection circuit, the X-ray protector activation voltage depends on the beam current. The X-ray protector, however, is normally activated at approximately 30kV (when the beam current is approximately 1mA). D709 and C704 rectify the increase in the pulse voltage output from pin 6 of T701. Pin 24 of IC102 detects this rectified voltage. If the detected voltage exceeds the specified value, the SUSPEND signal output from pin 5 of IC102 will be set to 'Low', and the P-OFF signal output from pin 42 will be also set to 'Low' (power-off mode). In addition, operation of IC701 will be stopped. This condition of the protection circuit will be retained until the power switch is turned OFF.

1.6.2 Beam current protection circuit

When the current supplied to the high voltage generating winding of FBT exceeds approx. 1.5mA, the protection circuit functions. The detection of the beam current is executed by the voltage fall of R722 connected between T901 pin 9 and the 12V.
Resistors R723 and R724 divide the potential of this voltage. The divided voltage is then input to pin 27 of IC102 via IC703. If the input voltage exceeds the specified value, the SUSPEND signal output from pin 5 of IC102 will be set to 'Low', and the P-OFF signal output from pin 42 will be also set to 'Low' (power-off mode). In addition, operation of IC701 will be stopped. This condition of the protection circuit will be retained until the power switch is turned OFF.

1.6.3 IC701 overcurrent protection circuit

The peak value of the drain current of Q701 and the both-end voltages of source resistors R708 and R709 are detected by pin 2 of IC701. If the voltage of this pin exceeds 1.2V (typ), pin 9 of IC701 will stop outputting the drive waveform. If the voltage of IC701 pin 2 drops below 1.2V (typ), pin 9 of IC701 will output the drive waveform again.

1.6.4 IC701 overload protection circuit

If overload occurs consecutively and the overcurrent protection circuit is activated consecutively, this overload protection circuit will enter the latch mode to stop operation. If the voltage of IC701 pin 2 exceeds 1.0V (typ), C709 will be charged. If the voltage of IC701 pin 13 exceeds 2.5V (typ), IC701 will enter the latch mode to stop the control operation. This condition of the protection circuit will be retained until the power switch is turned OFF.

1.6.5 IC902 overcurrent protection circuit

IC902 is equipped with an overcurrent protection circuit. R928 detects the drain current of the incorporated FET. If the voltage of IC902 pin 1 exceeds approximately 0.7V, this overcurrent protection circuit will be activated.

1.6.6 Short-circuit protection circuit on secondary power side

The output line of each secondary power (+215V, +80V, +15V, +8V, -15V) is equipped with a short-circuit detection circuit. If a secondary line is overloaded and the output voltage drops by 30 to 40% of the normal voltage, this short-circuit protection circuit will be activated.

1.6.7 Overvoltage protection circuit

The harmonic suppression circuit (active filter circuit) and the main power circuit are respectively equipped with an overvoltage protection circuit. If the voltage between both ends of C911 rises by 10% of the normal voltage, or if the voltage of the main power secondary output line rises by 30 to 40% of the normal voltage,

operations of IC901 and IC902 will be stopped.

1.7 Adjustment

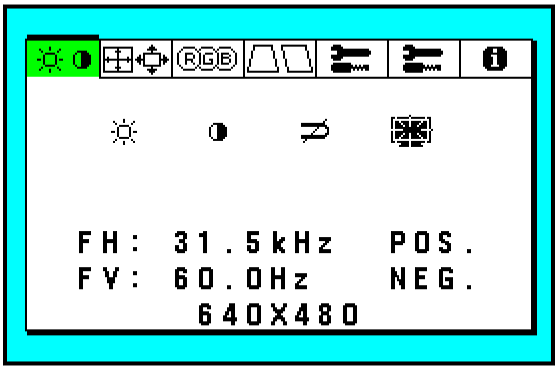
1.7.1 Adjustment mode

This monitor has the following adjustment modes.
(1) User mode (Normal mode)
(2) Factory mode (Factory adjustment mode)

1.7.2 User mode (Normal mode)

This is the mode user executing the adjustment and setting. When pressing button of EXIT, (<), (>), (-), (+) and SELECT on the front panel, the following menu picture is displayed on the screen.

The adjusted data in the user mode is memorized to EEPROM automatically.



The adjustment group can be selected with (<), (>), (-) and (+) buttons.
(+) and (-) buttons have the functions of the variable of the adjustment value.
The items can be adjusted in the user mode are as following table.

OSM menu (User mode)

Group icon	Item icon	Item	Adjustment −	Adjustment +
Group 1		BRIGHTNESS	To decrease the brightness.	To increase the brightness.
		CONTRAST	To decrease the contrast.	To increase the contrast.
		DEGAUSS	N/A	To eliminate possible color shading or impurity.
		CONSTANT BRIGHTNESS	N/A	Activates the constant brightness function.
		RESET	Restore to factory preset level with RESET button.	
Group 2		AUTO ADJUST	N/A	To adjust the screen size automatically based on input timing.
		LEFT / RIGHT	To move the image to the left.	To move the image to the right.
		DOWN / UP	To move the image down.	To move the image up.
		NARROW / WIDE	To narrow the width of the image on the screen.	To expand the width of the image on the screen.
		SHORT / TALL	To narrow the height of the image on the screen.	To expand the height of the image on the screen.
		RESET	Restore to factory preset level with RESET button.	
Group 3	1 2 3 sRGB 5	COLOR TEMPERATURE ADJUSTMENT (9300K, 8200K, 7500K, SRGB, 5000K)	N/A	N/A
	For each color temperature	COLOR TEMPERATURE	To decrease the color temperature.	To increase the color temperature.
		R RED	To decrease the red color.	To increase the red color.
		G GREEN	To decrease the green color.	To increase the green color.
		B BLUE	To decrease the blue color.	To increase the blue color.
		RESET	Restore to factory preset level with RESET button.	
Group 4		IN / OUT (PIN CUSHION)	Forms a pin.	Forms a barrel.
		LEFT / RIGHT (PIN CUSHION BALANCE)	Distorts the screen leftward.	Distorts the screen rightward.
		TILT (PARALLELOGRAM)	Distorts the upper section leftward.	Distorts the upper section rightward.
		ALIGN (TRAPEZOIDAL)	Narrows the upper section.	Narrows the lower section.
		ROTATE (RASTER ROTATION)	To rotate the image counterclockwise.	To rotate the image clockwise.
		TOP	The upper section forms a pin.	The upper section forms a barrel.
		TOP-BALANCE	Distorts the upper section leftward.	Distorts the upper section rightward.
		BOTTOM	The lower section forms a pin.	Lowers the lower section.
		BOTTOM-BALANCE	Distorts the lower section leftward.	Distorts the lower section rightward.
		RESET	Restore to factory preset level with RESET button.	

Group icon	Item icon	Item	Adjustment –	Adjustment +
Group5		MOIRE CLEAR	Reduces the m oire value.	Increases the m oire value.
		CONVERGENCE (HOR.)	The red moves to the left side of the green.	The red moves to the right side of the green.
		CONVERGENCE (VER.)	The red moves below the green.	The red moves above the green.
		LINEARITY (VER.)	Contracts the center area.	Elongates the center area.
		VERTICAL BALANCE	Elongates the lower section of the screen.	Elongates the upper section of the screen.
		GLOVAL SYNC (TL)	The green screen will be reddish.	The green screen will be bluish.
		GLOBAL SYNC (TR)	The green screen will be reddish.	The green screen will be bluish.
		GLOBAL SYNC (BL)	The green screen will be reddish.	The green screen will be bluish.
		GLOBAL SYNC (BR)	The green screen will be reddish.	The green screen will be bluish.
		RESET	Restore to factory preset level with RESET button.	
Group 6		LANGUAGE	Selects the left items.	Selects the right item.
		OSM POSITION	C→BR→BL→TR →TL	C→TL→TR→BL→ BR
		OSM TURN OFF	Reduces the time.	Increases the time.
		OSM LOCK OUT	N/A	Turns ON (+: SELECT key)
		IPM OFF MODE	ON	OFF
		EDGE LOCK	FRONT	BACK
		HOT KEY	ON	OFF
	ALL RESET	FACTORY PRESET	N/A	Restores all items to the factory preset level.
		RESET	Restore to factory preset level with RESET button.	
Group 7	MODE	DISPLAY MODE	N/A	N/A
		MONITOR INFO	N/A	N/A
	Hz	REFRESH NOTIFIER	ON	OFF
	Group 7	RESET	Restore to factory preset level with RESET button.	

* Reset: Select an adjustment item and press the RESET key, then, it restores to factory preset level.

1.7.3 Factory mode

This mod can adjust all of items, and also change the factory default adjustment data (reset data).

1.7.3.1 How to entering to Factory mode

The setting of the factory mode is executed by the following procedures.
(1) Power ON with EXIT button pressed, and confirm that the following OSM picture appears.

```
S2-0W-01
FACT DATA        0
```

(3) Press (-) button once to set the data value to 255.
(4) Press (+) button to set the data value to 5.
(5) Press SELECT button to move to the factory mode.
(6) As shown below, the adjustment data (hexadecimal number) and the adjustment group of FAC1, FAC2 and FAC3.

```
FACTORY-1

CPDIS  PRDIS  HVZER
V-PUR  HPR-G  DBF2T
DBF2B  DBF4T  DBF4B
HFOCS  VFOCS  HFOCD
SOG-E  DIREC  WPDDC
HPURC  VPURC  6H-DC
```

1.7.3.2 How to cancel Factory mode

Follow the procedure below to cancel the factory mode:
(1) Using the (>) button, select the FAC3 group, and then press the (>) button again. The following OSM picture will appear.

```
S2-0W-01
FACT DATA        0
```

(2) Press the (+) or (-) button to set the data value to '10'.
(3) Press the (SELECT) button. The factory mode will be canceled.

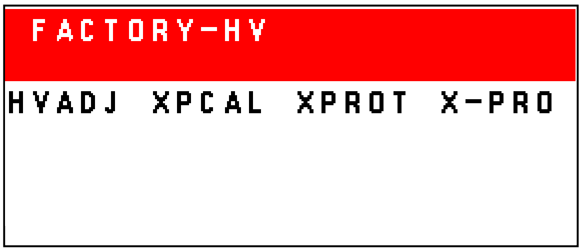
1.7.3.3 How to enter FACTORY-HV mode

Follow the procedure below to enter the FACTORY-HV mode:
(1) Using the (>) button, select the FAC3 group, and then press the (>) button again. The following OSM picture will appear.

```
S2-0W-01
FACT DATA        0
```

(2) Press the (-) button to set the data value to '250'.

(3) Press the (SELECT) key to enter the FACTORY-HV mode.



(4) Press the (>) or (<) button. The FACTORY-HV mode will be canceled.

2. Adjustment procedure

2.1 Measuring instruments

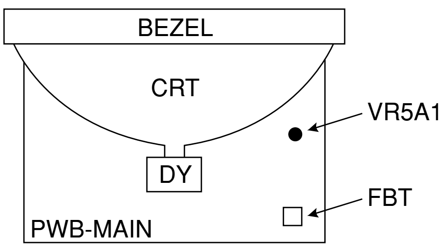
(1) Signal generator A: Astro Design VG-812 or equivalent
(2) Signal generator B: Astro Design VG-829 or equivalent
(3) DC voltmeter: 150V 0.5 Class or digital voltmeter
(4) High voltage meter: 0.5 Class that can measure 40KV
(5) Luminance meter: Minolta color analyzer CA-100 or equivalent
(6) AC voltmeter: 150V/300V 0.5 Class or equivalent
(7) Oscilloscope: Scope with band of 100MHz or more
(8) Landing measuring device: Felmo product
(9) Double scale: For width and distortion measurement
(10) Withstand voltage meter: Kikusui Model TOS8650 or equivalent
(11) Grounding conductivity measuring instrument: CLARE U.K. product
(12) Convergence meter: MINOLTA CC-100

2.2 Preparatory inspections

(1) There must be no cracks or remarkable contamination on the PWB.
(2) There must be no remarkable lifting or inclination of the parts on the PWB, and the parts must not be touching.
(3) The connectors must be securely inserted without crimping faults.
(4) The CRT socket, anode cap and focus lead must be securely mounted.
(5) The lead wires must not be pressed against the edges of the board.
(6) The lead wires must not touch the high temperature parts such as the R-METAL, R-CEMENT or TR with FIN.
(7) The board must not be bent, remarkably contaminated or scratched.
(8) The CRT has no scratch or chipping.
(9) Each potentiometer must turn smoothly.
(10) Always set each potentiometer to the following positions before turning the power ON.

Potentiometer default settings

PWB name	IC sources	Name (symbol)	Default adjustment position	Remarks
PWB-MAIN	VR5A1	H-POSI	Center	
		FOCUS1	Center	FBT
		FOCUS2	Center	FBT
		SCREEN	Completely counterclockwise	FBT



* look at inside of the monitor from upper side.

2.3 Names of each monitor part

2.3.1 Configuration of front control panel

a : Power button
b : Power indicator
c : EXIT button
d : CONTROL (Item select) buttons
e : CONTROL (Adjust) buttons
f : SELECT S/B MODE button
g : RESET button

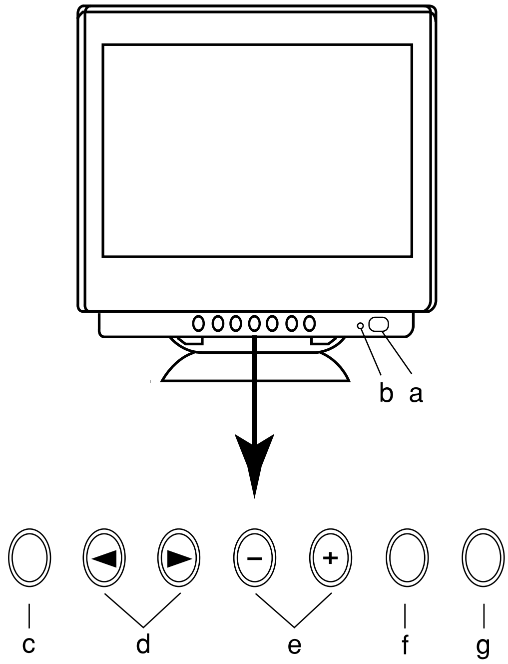


Figure 1 Front control panel

2.3.2 Configuration of rear input connector (signal input)

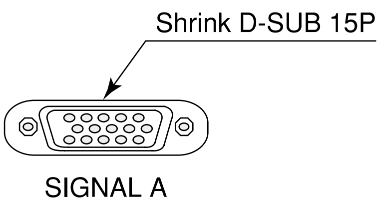


Figure 2 Rear input connector

2.3.3 OSM display matrix

2.3.3.1 User mode

Adjustment items	Setting contents	Default setting	Setting classification	
			By timings	Common
OSM group USER1				
BRIGHTNESS	0.0 ～ 100.0%	30.1%		○
CONTRAST	0.0 ～ 100.0%	100.0%		○
DEGAUSS	< + >			
CONSTANT BRIGHTNESS	< + >			○
OSM group USER2				
AUTO-ADJUST	< + >		○	
LEFT/RIGHT	0.0 ～ 100.0%		○	
DOWN/UP	0.0 ～ 100.0%	50%	○	
NARROW/WIDE	0.0 ～ 100.0%		○	
SHORT/TALL	0.0 ～ 100.0%		○	
OSM group USER3				
COLOR	COLOR1,2,3,sRGB,5	COLOR1		○
COLOR TEMP1,2,3,5	5000K-9300K	COLOR1:9300K		○
RED (GAIN)1,2,3,5	0.0 ～ 100.0%			○
GREEN (GAIN)1,2,3,5	0.0 ～ 100.0%			○
BLUE (GAIN)1,2,3,5	0.0 ～ 100.0%			
OSM group USER4				
IN/OUT	0.0 ～ 100.0%		○	
LEFT/RIGHT	0.0 ～ 100.0%		○	
TILT	0.0 ～ 100.0%		○	
ALIGN	0.0 ～ 100.0%		○	
ROTATE	0.0 ～ 100.0%	Adjustment value		○
TOP	0.0 ～ 100.0%		○	
TOP BALANCE	0.0 ～ 100.0%		○	
BOTTOM	0.0 ～ 100.0%		○	
BOTTOM BALANCE	0.0 ～ 100.0%		○	
OSM group USER5				
MOIRE CANCELER	0.0 ～ 100.0%	0.0%	○	
CONVERGENCE(HOR.)	0.0 ～ 100.0%	Adjustment value(16.8～82.7%)		○
CONVERGENCE(VER.)	0.0 ～ 100.0%	Adjustment value(27.8～71.7%)		○
LINEARITY(VER.)	0.0 ～ 100.0%		○	
VERTICAL BALANCE	0.0 ～ 100.0%		○	
GLOBAL SYNC(TL)	0.0 ～ 100.0%	Adjustment value(33.3～66.2%)		○
GLOBAL SYNC(TR)	0.0 ～ 100.0%	Adjustment value(33.3～66.2%)		○
GLOBAL SYNC(BL)	0.0 ～ 100.0%	Adjustment value(33.3～66.2%)		○
GLOBAL SYNC(BR)	0.0 ～ 100.0%	Adjustment value(33.3～66.2%)		○
OSM group USER6				
LANGUAGE	ENG/DEU/FRA/ESP/ITA/JPN	ENG		○
OSM POSITION	<- /+>	(OSM is at the center of picture)		○
OSM TURN OFF	5SEC ～ 120SEC	45SEC		○
OSM LOCK OUT	ON/OFF	OFF		○
IPM OFF MODE	ENABLE/DISABLE	ENABLE		○
EDGE LOCK	FRONT/BACK	BACK	○	
HOT KEY	OFF/ON	OFF		○
FACTORY PRESET	< + >			
OSM group USER7				
DISPLAY MODE				
MONITOR INFO		DPlus230SB		
REFRESH NOTIFIER	OFF/ON	OFF		○

2.3.3.2 Factory mode

Adjustment items	Setting contents	Default setting	Setting classification	
			By timings	Common
OSM group USER1				
BRIGHTNESS	0.0 ～ 100.0%	30.1%		○
CONTRAST	0.0 ～ 100.0%	100.0%		○
DEGAUSS	<+>			
CONSTANT BRIGHTNESS	<+>			○
OSM group USER2				
AUTO-ADJUST	<+>			
LEFT/RIGHT	0.0 ～ 100.0%		○	
DOWN/UP	0.0 ～ 100.0%	50%	○	
NARROW/WIDE	0.0 ～ 100.0%		○	
SHORT/TALL	0.0 ～ 100.0%		○	
OSM group USER3				
COLOR	---			△
COLOR TEMP1,2,3,5	---			○
R GAIN1,2,3,5	---			○
G GAIN1,2,3,5	---			○
B GAIN1,2,3,5	---			○
OSM group USER4				
IN/OUT	0.0 ～ 100.0%		○	
LEFT/RIGHT	0.0 ～ 100.0%		○	
TILT	0.0 ～ 100.0%		○	
ALIGN	0.0 ～ 100.0%		○	
ROTATE	0.0 ～ 100.0%	Adjustment value		○
TOP	0.0 ～ 100.0%		○	
TOP BALANCE	0.0 ～ 100.0%		○	
BOTTOM	0.0 ～ 100.0%		○	
BOTTOM BALANCE	0.0 ～ 100.0%		○	
PCC CENTER	0.0 ～ 100.0%		○	
PCC SINE	0.0 ～ 100.0%		○	
OSM group USER5				
MOIRE CANCELER	0.0 ～ 100.0%	0.0%	○	
CONVERGENCE(HOR.)	16.8 ～ 82.7%	Adjustment value		○
CONVERGENCE(VER.)	27.8 ～ 71.7%	Adjustment value		○
LINEARITY(VER.)	0.0 ～ 100.0%		○	
VERTICAL BALANCE	0.0 ～ 100.0%		○	
GLOBAL SYNC(TL)	33.3 ～ 66.2%	Adjustment value		○
GLOBAL SYNC(TR)	33.3 ～ 66.2%	Adjustment value		○
GLOBAL SYNC(BL)	33.3 ～ 66.2%	Adjustment value		○
GLOBAL SYNC(BR)	33.3 ～ 66.2%	Adjustment value		○
OSM group USER6				
LANGUAGE	ENG/DEU/FRA/ESP/ITA/JPN	ENG		○
OSM POSITION	<- /+>	(OSM is at the center of picture)		○
OSM TURN OFF	5SEC ～ 120SEC	45SEC		○
OSM LOCK OUT	---	OFF		○
IPM OFF MODE	ENABLE/DISABLE	ENABLE		○
EDGE LOCK	FRONT/BACK	BACK	○	
HOT KEY	OFF/ON	OFF		○
FACTORY PRESET	< + >			
OSM group USER7				
DISPLAY MODE				
MONITOR INFO		DPlus230SB		
REFRESH NOTIFIER	OFF/ON	OFF		○
DESTINATION	EUR	EUR: for Europe		

Adjustment items		Setting contents	Default setting	Setting classification	
				By timings	Common
FACT 1					
C-PURITY-DIS	CPDIS	0(0FF)/1(ON)	1(ON)		○
PURITY-DIS	PRDIS	0(0FF)/1(ON)	1(ON)		○
MAG-ZERO-HV	HVZER	PRO(EEh)			
V-CANCEL	V-PUR	000 ~ 0FF			○
H-CANCEL	HPR-G	000 ~ 0FF			○
DBFV2 TOP	DBF2T	000 ~ 7F			○
DBFV2 BOTTOM	DBF2B	000 ~ 7F			○
DBFV4 TOP	DBF4T	000 ~ 7F			○
DBFV4 BOTTOM	DBF4B	000 ~ 7F			○
DBF-H-AMP	HFOCS	000 ~ 0FF		○	
DBF-V-AMP	VFOCS	000 ~ 7F		○	
DBF-H-PHASE	HFOCD	000 ~ 64		○	
SYNC-ON-GREEN	SOG-E	0(OFF)/1(ON)	0(OFF)		○
DIRECT-KEY	DIREC	0(OFF)/1(ON)	1(ON)		○
DDC-EEP-WP	WPDDC	0(Unwritable)/1(Writable)	0(Unwritable)		○
H PURITY CHECK	HPURC	000 ~ 002	0		
V PURITY CHECK	VPURC	000 ~ 002	0		
FACT 2					
YHTT	YH-TT	000 ~ 0FF			○
YHTB	YH-TB	000 ~ 0FF			○
YHJT	YH-JT	000 ~ 0FF			○
YHJB	YH-JB	000 ~ 0FF			○
XH-L	XH-L	000 ~ 0FF			○
XH-R	XH-R	000 ~ 0FF			○
PQH-TL	PQHTL	000 ~ 0FF			○
PQH-TR	PQHTR	000 ~ 0FF			○
PQH-BL	PQH-BL	000 ~ 0FF			○
PQH-BR	PQH-BR	000 ~ 0FF			○
S3H-TL	S3HTL	000 ~ 0FF			○
S3H-TR	S3HTR	000 ~ 0FF			○
S3H-BL	S3HBL	000 ~ 0FF			○
S3H-BR	S3HBR	000 ~ 0FF			○
YVTT	YV-TT	000 ~ 0FF			○
YVTB	YB-TB	000 ~ 0FF			○
YVJT	YV-JT	000 ~ 0FF			○
YVJB	YV-JB	000 ~ 0FF			○
XV-L	XV-L	000 ~ 0FF			○
XV-R	XV-R	000 ~ 0FF			○
PQV-TL	PQVTL	000 ~ 0FF			○
PQV-TR	PQVTR	000 ~ 0FF			○
PQV-BL	PQVBL	000 ~ 0FF			○
PQV-BR	PQVBR	000 ~ 0FF			○
S3V-TL	S3VTL	000 ~ 0FF			○
S3V-TR	S3VTR	000 ~ 0FF			○
S3V-BL	S3VBL	000 ~ 0FF			○
S3V-BR	S3VBR	000 ~ 0FF			○
FACT 3					
R-BIAS-H	R-BS1	000 ~ 0FF			○
G-BIAS-H	G-BS1	000 ~ 0FF			○
B-BIAS-H	B-BS1	000 ~ 0FF			○
R-BIAS-M	R-BS2	000 ~ 0FF			○
G-BIAS-M	G-BS2	000 ~ 0FF			○
B-BIAS-M	B-BS2	000 ~ 0FF			○
R-BIAS-L	R-BS3	000 ~ 0FF			○
G-BIAS-L	G-BS3	000 ~ 0FF			○
B-BIAS-L	B-BS3	000 ~ 0FF			○

Adjustment items		Setting contents	Setting classification	
			By timings	Common
R-GAIN-H	R-GN1	000 ～ 0FF		○
G-GAIN-H	G-GN1	000 ～ 0FF		○
B-GAIN-H	B-GN1	000 ～ 0FF		○
R-GAIN-M	R-GN2	000 ～ 0FF		○
G-GAIN-M	G-GN2	000 ～ 0FF		○
B-GAIN-M	B-GN2	000 ～ 0FF		○
R-GAIN-L	R-GN3	000 ～ 0FF		○
G-GAIN-L	G-GN3	000 ～ 0FF		○
B-GAIN-L	B-GN3	000 ～ 0FF		○
BRIGHT-CENT	BTCEN	000 ～ 0FF		○
BRIGHT-MAX	BTMAX	000 ～ 0FF		○
ABL	ABLAJ	000 ～ 0FF		○
SBM CONTRAST1	SBCN1	000 ～ 7DC		○
SBM BRIGHT1	SBBR1	000 ～ FFF		○
SBM CONTRAST2	SBCN2	000 ～ 7DC		○
SBM BRIGHT2	SBBR2	000 ～ FFF		○
FACT HV				
HV-ADJ CAUTION		000～0A8		○
XPRO-CALIBRATION		000～OFF		○
XPRO-TST CAUTION		000～OFF		○
XPRO-ADJ CAUTION		HVADJ+20～OFF		○

2.4 Adjustment

2.4.1 How to select the factory adjustment (FACTORY) mode

2.4.1.1 Selecting with front panel switches

(1) Turn the power ON while holding down EXIT button.
(2) After step (1), release EXIT button after one to two seconds.
(3) Confirm that 255 is displayed for the counter of FACT DATA on OSM display.
(4) Set to 05 with (+) button.
(5) When SELECT S/B MODE button is pressed, the factory mode will be entered.
This factory adjustment mode is entered with the above steps.

*The factory adjustment mode remains valid even after the power is turned OFF.
Note that steps (3) to (4) must be carried out within ten seconds. If ten seconds are exceeded, the mode will return to the user mode.

<Returning to the user mode from the factory mode>

(1) Display FACT DATA on OSM picture with the group selection.
(2) Set the counter value to 010 with (-) (+) buttons.
(3) When SELECT S/B MODE button is pressed, the mode will return to the user mode.

2.4.2 Adjustments before aging

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Before aging		The only the sync. signal of
			No. 12:106.25kHz / 85Hz, 1600x1200

2.4.2.1 Adjusting the high voltage and high voltage protector

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	High voltage and high		The only the sync. signal of
	voltage protector		No. 12:106.25kHz / 85Hz, 1600x1200

(Timing No. 12 (106.25 kHz/85 Hz, 1600x1200) SYNC signal is only input)

(1) Turn the monitor power OFF and connect a high voltage indicator to the anode of CRT before turning the monitor power ON.
(2) Select "FACT DATA***" on OSM and set to 250 using (-) button before pushing the SELECT S/B MODE button.
(3) Select HVADJ (HV-ADJ CAUTION) on OSM to adjust the high voltage to 27.0kV±0.5kV.
(4) Select XPCAL (XPRO-CALIBRATION) on OSM and turn the screen VR all the way down counterclockwise before adjusting the high voltage to 31.0kV±0.5kV by manipulating (+) (-) buttons.
(5) With SELECT S/B MODE button pushed, the protector operation point is set, causing the high voltage to return to 27.0kV±0.5kV.
(6) Rotate the screen VR so that OSM can be confirmed.
(7) Select XPROT (XPRO-TST CAUTION) on OSM by the manipulation shown above and turn the screen VR all the way down counter-clockwise.
(8) Raise the voltage manipulating (+) button and make sure that the high-voltage protection circuit gets activated at 31.0kV±0.5kV.

2.4.2.2 FOCUS adjustment (Rough adjustment)

(1) Set the brightness so that the raster can be confirmed with the FBT picture potentiometer (screen VR).

(2) Adjust the focus pack "FOCUS 1, 2" so that both edges of the picture are clear.

2.4.2.3 Shock test

(1) Display the "color bar" with the signal generator A.

(2) Confirm that there is no abnormality in the image when shock is applied on the monitor.

2.4.2.4 Preadjustment before aging

(1) Change to FACTORY MODE (aging mode) in advance.

(2) Display a full white with the signal generator A.

(3) Confirm that the R, G and B channel images are output.

(4) Confirm that the picture position, picture size, PCC and balance can be controlled, and roughly adjust.

(5) Adjustment of BTCEN (BRIGHT-CENT), BTMAX (BRIGHT-MAX), BS1 (BIAS-H)

a) Input timing No. 12 (1600x1200 106.25K/85) with the signal generator (R, G and B OFF).

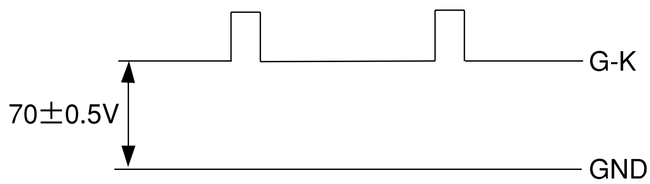
b) Set each adjustment item to the following value.

BRIGHTNESS	: 7F
(FACT3)	
R-BS1(R-BIAS-H)	: 00
G-BS1(G-BIAS-H)	: 8A
B-BS1(B-BIAS-H)	: 00
BTCEN (BRIGHT-CENT)	: 5E0
BTMAX (BRIGHT-MAX)	: 800

c) Connect PWB-CRT TP (R200G lead wire) to the probe.

d) Select BTCEN (BRIGHT-CENT) in FACT3, set the black level voltage of PWB-CRT TP (R200G lead wire) to 70 +/- 0.5V with the oscilloscope (refer to the following picture).

* In use of the digital voltage meter, set it to 73 +/- 0.5V.



e) Set the back raster luminance to 0.5 +/- 0.3 cd/cm² with BRIGHTNESS adjustment.

f) Adjust the back raster color coordination to the following value with R-BS1 (R-BIAS-H) and B-BS1 (B-BIAS-H).

x: 0.283±0.02 / y: 0.297±0.02

* Do not adjust BTCEN (BRIGHT-CENT) after the adjustment of back raster color coordination carried out at f) above, but it can be adjusted in main adjustment mentioned after 2.4.3.

* BRIGHTNESS should be adjusted when the back raster is varied in adjustment of purity and convergence.

(6) Confirm that OSM power management is OFF.

(7) Disconnect the signal and confirm that the following picture appears on OSM. Then adjust OSM picture luminance with BRIGHTNESS adjustment, and carry out heat run for 60 minutes or more.

OWN VER
S2-OW-** 1.*.**
(Initial data file name)

2.4.2.5 Adjusting the landing (ITC/4 corner purity adjustment)

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	landing		No. 12:106.25kHz / 85Hz, 1600x1200
			Full green

(1) Input the timing No. 12 (106. 25kHz/85Hz, 1600x1200) full green signal.
(2) Turn OFF the monitor power to carry out hand degaussing.
(3) Select GLOBAL SYNC (TL) on OSM.
(4) Adjust to the best condition using (-) (+) buttons. Here, make sure that the adjusted value is within the range of OSM display value = 55h (85) to A9h (169).
(5) Carry out similar adjustment for TR/BL/BR (GLOBAL SYNC).
Note) When the substrate is replaced at the time of repair, set TL/TR/BL/BR to the values before replacement before carrying out adjustment.
(6) Input the timing No.12 (106.25kHz/85Hz, 1600x1200) full white signal.

2.4.3 Adjusting the picture size, position, distortion, DBF amplitude and phase

The manual adjustment methods are explained below. The adjustments are executed in the factory adjustment (factory) mode.
Adjust the picture size to the value indicated in the list of adjustment values.(Refer to 2.5.1.10 Adjustment value list.)
Adjust the distortion to the value indicated in the picture performance inspection item. (Refer to 2.5.1.8 Picture distortion.)

2.4.3.1 Adjusting the picture inclination

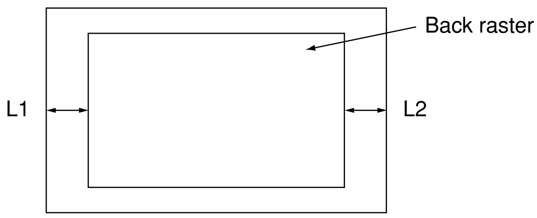
Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Picutre inclination	Factory	No. 12:106.25kHz / 85Hz,1600x1200
			Crosshatch with frame

Set OSM to ROTATE, and using (-) (+) buttons, set the raster inclination to be horizontal to the CRT face surface.

2.4.3.2 Adjusting the back raster position

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Back raster position	Factory	No. 12:106.25kHz / 85Hz, 1600x1200
			Only the sync. signal input

(1) Set BRIGHTNESS to 100% to show the back raster.
(2) Select LEFT/RIGHT and DOWN/UP, adjust the horizontal back raster position to the center of the bezel using (-) (+) buttons.
At this time, the raster width should be $|L1-L2| \leq 2.0mm$.



2.4.3.3 Adjusting the left/right distortion, picture width, picture position (LEFT/RIGHT) and vertical linearity (all preset)

(1) Set DOWN/UP of the user mode to 50%.

<Setting in the factory mode with the following steps>

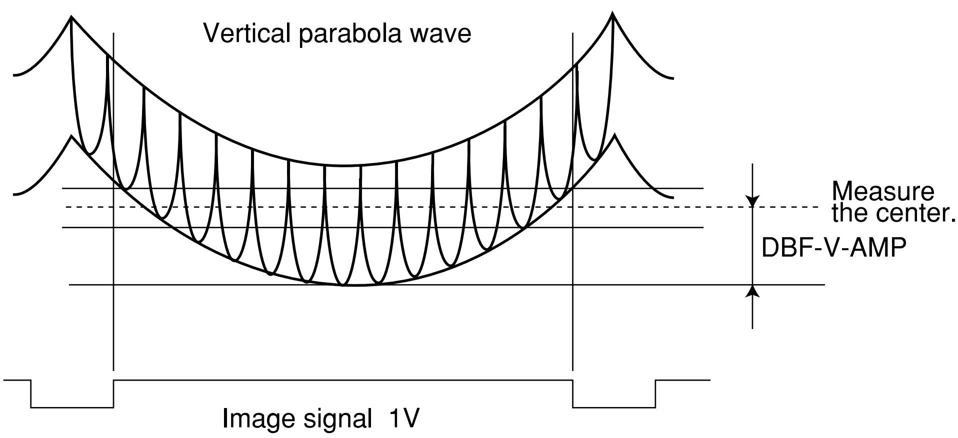
(2) Adjust the vertical size to approx. 297mm, and the vertical position to the approximate center.
(3) Select LINEARITY (VER.) and VERTICAL BALANCE with OSM, and adjust so that the vertical linearity is equal at the very top of the picture, at the very bottom of the picture, and at the center of the picture.
(4) Select SHORT/TALL and DOWN/UP with OSM, and adjust the vertical width and vertical position to the specified values using (-) (+) buttons.
(5) Select IN/OUT, ALIGN, PCC CENTER, TOP and BOTTOM with OSM, and adjust the vertical line at both side of the picture to the straight line using (-) (+) buttons.
(6) If the left and right distortions differ, select LEFT/RIGHT (PIN VAL), TILT, TOP-BALANCE and BOTTOM-BALANCE with OSM, and adjust so that the distortions are visually balanced.
(7) Select LEFT/RIGHT with OSM, and adjust the horizontal raster position to the center of the picture using (-) (+) buttons.
(8) Select NARROW/WIDE with OSM, and adjust the horizontal raster width to the value given in the adjustment list using using (-) (+) buttons. (Refer to 2.5.1.10 Adjustment value list.)

*Note (1) PCC SINE, LEFT/RIGHT (PIN VAL) and PCC CENTER are used only for touch up.

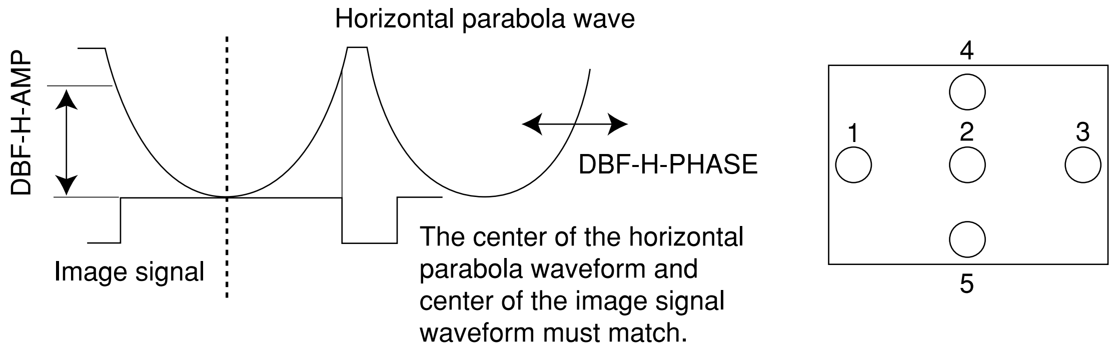
Note (2) The picture position and distortion must be within the ranges given in the picture performance inspection items. (Refer to 2.5.1.8 Picture distortion.)

2.4.3.4 Adjusting the DBF amplitude and phase

(1) Connect the oscilloscope to the lead of R7A2 (SG702 side) on PWB-MAIN and to one of the signal outputs for the signal sources full R, G, B (VIDEO).
(2) Set OSM to the select picture of HFOCUS (DBF-H-AMP) in FACT 1, and using (-) (+) buttons adjust the horizontal parabola wave amplitude (image area) to the value given in the list of adjustment values. (Refer to 2.5.1.10 Adjustment value list.)



DBF-V-AMP adjustment



DBF-H-AMP / PHASE adjustment

(3) Set the output of the signal generator to crosshatch (white/normal).
(4) Set OSM to the select picture of HFOCD (DBF-H-PHASE) in FACT1, and adjust the focus balance of point 1 and point 3 in the above figure using (-) (+) buttons.
* (3) and (4) should be carried out with all preset timing.
(5) Set OSM to the select picture of DBF2T (DBFV2 TOP) in FACT1, and adjust using (-) (+) buttons so that the focus level of point 4 and point 2 in the above figure can be balanced.
(6) Set OSM to the select pictutre of DBF2B (DBFV2 BOTTOM) in FACT1, and adjust using (-) (+) buttons so that the focus level of point 2 and point 5 in the above figure can be balanced.
* (5) and (6) should be carried out with timing No. 12 (106.25kHz/85Hz, 1600x1200).

2.4.4 Adjusting the cut off

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Cut off	Factory	No. 12:106.25kHz / 85Hz, 1600x1200

2.4.4.1 Adjusting BTCEN (BRIGHT-CENT), BTMAX (BRIGHT-MAX) and BS1 (BIAS-H)

<In case pre-adjustment before aging is carried out >

(1) Input timing No. 12 (106.25kHz/85Hz, 1600x1200) with the signal generator (R, G and B OFF).
(2) Set each adjustment item to the following value.

BRIGHTNESS	: 7F
(FACT3)	
R-BS1(R-BIAS-H)	: 00
G-BS1(G-BIAS-H)	: 8A
B-BS1(B-BIAS-H)	: 00
BTMAX (BRIGHT-MAX)	: 800

(3) Set the back raster luminance to 0.3 +/- 1cd/m^2 with FBT screen VR.
(4) Adjust the back raster color coordination to the value listed in the following table with R-BS1 (R-BIAS-H) and B-BS1 (B-BIAS-H).
(5) Adjust the back raster luminance to 0.3 +/- 0.1cd/m^2 with BTCEN.
(6) If the back raster color coordination is deviated from the values listed in the following table, repeat steps (4) and (5).
(7) Adjust the back raster luminance to 3.0 +/- 0.2cd/m^2 with BTMAX.

<In case pre-adjustment before aging is not carried out >

(1) Input timing No. 12 (106.25kHz/85Hz, 1600x1200) with the signal generator (R, G and B OFF).

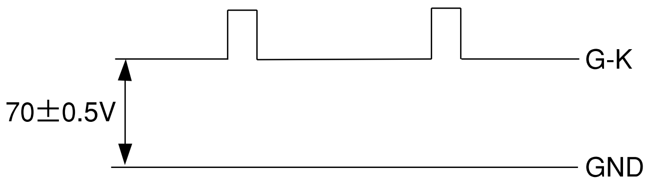
(2) Set each adjustment item to the following value.

BRIGHTNESS	: 7F
(FACT3)	
R-BS1(R-BIAS-H)	: 00
G-BS1(G-BIAS-H)	: 8A
B-BS1(B-BIAS-H)	: 00
BTCEN (BRIGHT-CENT)	: 5E0
BTMAX (BRIGHT-MAX)	: 800

(3) Connect PWB-CRT TP (R200G lead wire) to the probe.

(4) Select BTCEN (BRIGHT-CENT) in FACT3, set the black level voltage of PWB-CRT TP (R200G lead wire) to 70 +/- 0.5V with the oscilloscope (refer to the following picture).

* In use of the digital voltage meter, set it to 73 +/- 0.5V.



(5) Set the back raster luminance to 0.3 +/- 1cd/m^2 with FBT screen VR.

(6) Adjust the back raster color coordination to the value listed in the following table with R-BS1 (R-BIAS-H) and B-BS1 (B-BIAS-H).

(7) Adjust the back raster luminance to 0.3 +/- 0.1cd/m^2 with BTCEN.

(8) If the back raster color coordination is deviated from the values listed in the following table, repeat steps (6) and (7).

(9) Adjust the back raster luminance to 3.0 +/- 0.2cd/m^2 with BTMAX.

* The following table is applicable for the monitor without the back cover.

Adjustment value of BS1 (BIAS-H)

Adjustment item		BS1 (BIAS-H)
Color temperature		(9300K)
Color coordination	x	0.283±0.015
	y	0.297±0.015

2.4.4.2 Adjusting BS2 (BIAS-M) / BS3 (BIAS-L)

(1) Set R-BS2 (R-BIAS-M), G-BS2 (G-BIAS-M) and B-BS2 (B-BIAS-M) to the value listed in the following table.

(2) Set R-BS3 (R-BIAS-L), G-BS3 (G-BIAS-L) and B-BS3 (B-BIAS-L) to the value listed in the following table.
As the values listed in the following table are the finite differences from the values of BS1 (BIAS-H), this adjustment should be carried out after adjustment of BS1 (BIAS-H).

Adjustment data of BS2 (BIAS-M) / BS3 (BIAS-L)
(*The following data is the finite difference from BS 1 (BIAS-H).)

Adjustment item		BS2 (BIAS-M)	BS3 (BIAS-L)
Color temperature		(6500K)	(5000K)
Data	R-BS	+3	+5
	G-BS	same value	same value
	B-BS	-4	-8

2.4.5 Setting CONSTANT BRIGHTNESS circuit (Factory mode)

Note) This operation should be carried out after the adjustment of cut-off. In addition, heat-running should be fully carried out.

2.4.5.1 Reading beam current default data

(1) Input timing No. 12 (106.25kHz/85Hz, 1600x1200) crosshatch signal with the signal generator.

(2) Select CONSTANT BRIGHTNESS and push (-) button, then it starts to read the beam current default data.

(3) When the reading is completed, OSM standard voltage DAC (Digital Analog Converter) data and the beam current default data of each color (R/G/B) are indicated. Then, confirm that the data is within the following value range.

Standard voltage DAC data	: 50-F0 (HEX)
Red beam current default data	: 73-8C (HEX)
Green beam current default data	: 73-8C (HEX)
Blue beam current default data	: 73-8C (HEX)

(4) If the above data could not be within the value range specified above (3), carry out steps (2) and (3) mentioned above once.

(5) Measure the luminance and color coordination of the back raster.

2.4.5.2 Confirming CONSTANT BRIGHTNESS function

(1) Select COSTANT BRIGHTNESS. Push (+) button, and it decrements the BRIGHTNESS data to imitate the deteriorated condition due to elapsed time, then compensation function starts to operate.

(2) Measure the color coordination and luminance of the back raster after compensation. Compare them to the data measured in 2.4.5.1 (5) to confirm that the differences are within the following value range.

Color coordination of x and y	: within +/- 0.020
Luminance	: within +/- 0.05cd/m^2

(3) If the color coordination and luminance of the back raster could not be within the value range specified in (2) above, select CONSTANT BRIGHTNESS and push RESET button, then carry out step 2.4.5.1 (2) once.

(4) Select CONSTANT BRIGHTNESS, and push RESET button.

2.4.6 Adjusting the RGB drive signal

2.4.6.1 Adjusting GN1 (GAIN-H) (adjustment of 9300K)

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	GN1 (GAIN-H)	Factory	No. 12:106.25kHz / 85Hz, 1600x1200
			Full white

(1) Input the following adjustment timing with the signal generator.
Pattern: Full white (Input amplitude = 0.7Vp-p)
Adjustment timing: No.12 (106.25kHz/85Hz, 1600x1200)

(2) Select CONTRAST with OSM, and set to MAX using (+) button.

(3) Select BRIGHTNESS, and set the data to 7F using (-) (+) buttons.

(4) Output the solid color for the picture from Signal generator A, and input GREEN only.

(5) Set G-GN1 (G-GAIN-H) with OSM, and adjust the luminance of full green picture to the specified value listed in the following table with (-) (+) buttons.

(6) Input BLUE, RED and GREEN, and select B-GN1 (B-GAIN-H), R-GN1 (R-GAIN-H) and G-GN1 (G-GAIN-H) appropriately, then adjust each data to the specified value listed in the following table with (-) (+) buttons.

(7) Confirm that the variation of the color coordination data of x and y is within +/- 0.015 when CONTRAST is set to 25cd/m^2 with OSM.

(8) Adjust GN2 (GAIN-M) and GN3 (GAIN-L) to the specified value listed in the following table in the same manner as GN1 (GAIN-H).

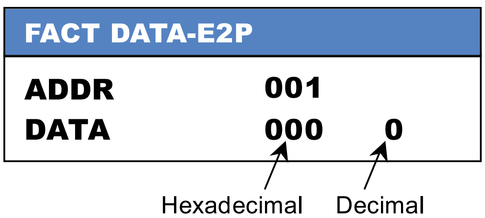
COLOR TEMPERATURE		GN1 (GAIN-H)	GN2 (GAIN-M)	GN3 (GAIN-L)	TOLERANCE
Color temperature		(9300K)	(6500K)	(5000K)	
Full green luminance		77.0	66.0	54.0	±1.0
Full White	x	0.283	0.313	0.345	±0.005
color coordination	y	0.297	0.329	0.359	±0.005
Full white luminance(cd/m^2)		105 or more	90 or more	75 or more	

(9) Setting R/G/B MAX GAIN
Set the MAX GAIN value for the following formula to the following address (all setting values are indicated by HEX).
Firstly hexadecimal number should be converted to decimal number to be calculated, then the result figured out is return to hexadecimal numbers to be written into the applicable address.
How to write into address is described below.

MAX GAIN = MAX value of R/G/B GAIN adjustment value (*1) x {1 + (MAX value of SBCN1, 2 (*2) /FF)
Address (HEX): 89 (R-GAIN-MAX), 8a (G-GAIN-MAX), 8b (B-GAIN-MAX)

(*1): MAX value of R/G/B GAIN adjustment value is the maximum one among R-GN1, G-GN1, B-GN1, R-GN2, G-GN2, B-GN2, R-GN3, G-GN3 and B-GN3 in OSM (FACTORY-3) adjusted according to the procedure (1) to (8) mentioned above.
(*2): MAX value of SBCN1, 2 is the maximum one between SBCN1 and SBCN2 in OSM (FACTORY-3).
Note) All of (MAX GAIN), (MAX value R/G/B GAIN) and (SBCN1 and SBCN2) are indicated by hexadecimal number (HEX), the value is to be converted to the decimal number (DEC) first to be calculated, then, converted to the hexadecimal number (HEX).

<How to rewrite into address>
(a) Change to FACTORY MODE in advance.
(b) Set the counter of FACT DATA on OSM to 99 using (-) (+) buttons, and push SELECT button.
(c) Press either (◀) or (▶) button, and confirm that the following picture appears.



(d) Using (-) (+) buttons rewrite the counter for every hexadecimal data to the one figured out with the calculation mentioned above (decimal data is to be rewritten following to hexadecimal one synchronously).
(e) Press EXIT button, then the rewritten data is to be registered.
(f) To disable this rewriting function, turn the power OFF. However, FACTORY MODE is still alive even if the power was turned off.

NOTE) Be careful NOT to wrongly rewrite the data since this rewriting function is available for all of the EDID data.

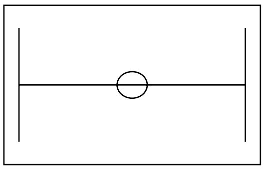
2.4.6.2 Adjusting ABL

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	ABL	Factory	No. 12:106.25kHz / 85Hz, 1600x1200
			Full white

(1) Input the following adjustment timing with the signal generator.
Pattern: Full white (input amplitude = 0.7Vp-p)
Adjustment timing: No.12 (106.25kHz/85Hz, 1600x1200)
(2) Select ABLAJ (ABL) with OSM, and adjust to 115cd/m² +/- 5.
Here, the picture size should follow 2.5.1.10 Adjustment value list.

2.4.7 Adjusting the focus

NOTE) For adjustment of focus with FOCUS VR, be sure to use ISOLATED alignment driver.

	Normal or reverse display	Point to align with
Vertical line	Reverse display (Green)	 Adjust to FOCUS JUST at the circled sections using FBT FOCUS1-VR mainly and FBT FOCUS2-VR with well balancing. The ratio of core : Halo of the vertical lines at both sides shouled be 1 : 1.
Horizontal line	Normal display	 Adjust to FOCUS JUST at the center of screen (circled section) using FBT FOCUS1-VR mainly and FBT FOCUS2-VR with well balancing. Adjust to halo condition once, then adjust to FOCUS JUST.

* Adjust halo to a quarter of core with camera adjustment.
Halo should be a half of core maximum.

<Adjusting the static focus>

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Static focus		No. 12:106.25kHz / 85Hz, 1600x1200
			H character, crosshatch

For steps (1) and (2), use the timing No. 12 (106.25kHz/85Hz, 1600x1200) H character pattern and crosshatch pattern.
For step (3), use all preset timing H character patterns and crosshatch patterns.

(1) Display a green or white crosshatch pattern, and adjust the focus according to the procedure mentioned above.
(2) If the DBF voltage is insufficient or excessive, select HFOCS (DBF-H-AMP) from OSM, and readjust with (-) (+) buttons. Then repeat step (1), and adjust so that the following judgement conditions are satisfied.
(3) For all of the other preset timings, if the DBF voltage is insufficient or excessive, select HFOCS (DBF-H-AMP) from OSM, and readjust with (-) (+) buttons.
(4) If the focus is unbalanced at right side and left side with other preset timings.
Select HFOCD (DBF-H-PHASE) and readjust with (-) (+) buttons.
(5) If the focus is unbalanced at top and bottom with timing No. 12 (106.25kHz/85Hz, 1600 x 1200), select DBF2T (DBFV2 TOP) and DBF2B (DBFV2 BOTTOM) and readjust with (-) (+) buttons.

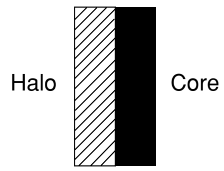
(6) After inputting check timing No. 5 in user mode and operates AUTO-ADJUST function, confirm the focus with "e" character pattern in reverse. If "e" character is indistinct, repeat step (1) to readjust.

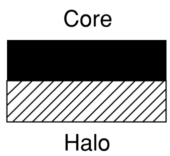
*Adjustment votlage max value:
DBF-H-AMP H width: 396mm: 430V
DBF-V-AMP V width: 297mm: 200V

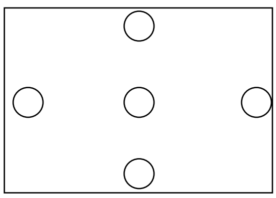
The focus is judged as follows.

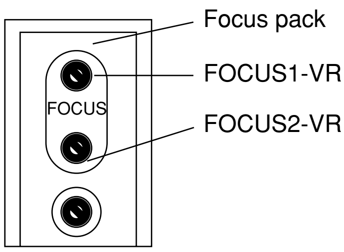
Timing	Judgment pattern (Note 1) (Note 2)
Normal display (All preset)	Crosshatch pattern
Reverse display Resolution: ≤1600x1200 Resolution: >1600x1200	 Judge with pattern A Judge with pattern B

(Note 1) Pattern A: Font 7 ×9, Cell 10×11, e character
Pattern B: Font 7 ×9, Cell 10×11, H character
(Note 2) Focus judgement: Crosshatch pattern should be used for normal display judgement
The ratio of core : Halo is as follows.
Should be 1 : 0.5 or less at the center of the picture.
Should be 1 : 1.5 or less at the both sides of the picture
To judge the reverse display, do not carry out a relative evaluation with the other point on the screen. Instead, judge whether the e (H) character can be read distinctly at that point.





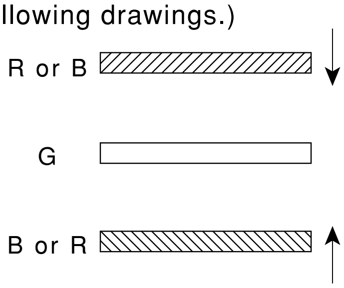

Focus attention point



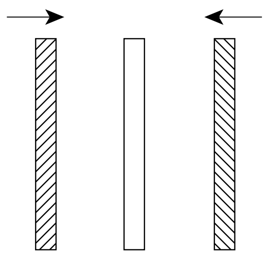
2.4.8 Adjusting the convergence

2.4.8.1 Adjusting with ITC

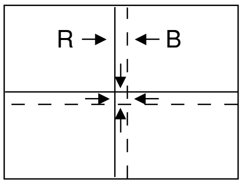
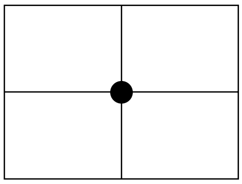
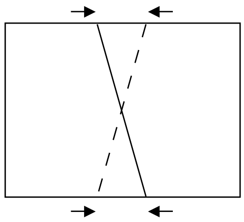
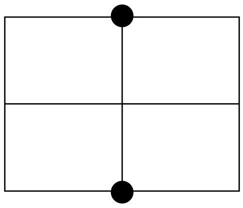
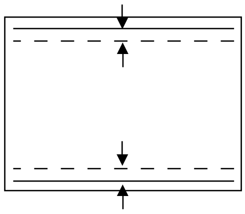
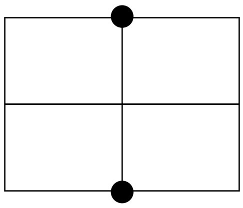
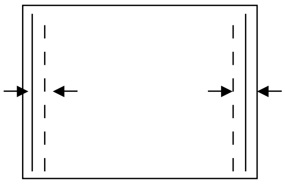
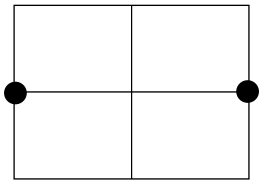
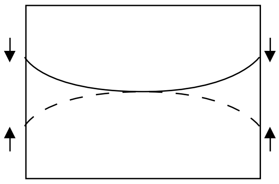
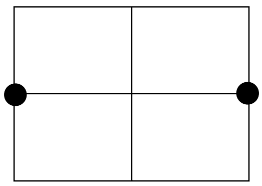
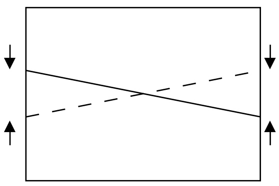
Before adjusting the center mis-convergence and axial mis-convergence, carry out sufficient full white aging (100cd/m^2 or more, for one hour or more). Then, adjust with the following timing.
Timing: No. 12 (106.25kHz/85Hz,1600x1200) crosshatch pattern
Confirm that the following DDCP default setting is as shown in the table of 2.3.2.2 Factory mode (OSM display matrix).
All items of OSM group USER5 and FACT2 of Factory mode
Adjust the horizontal and vertical convergence to the optimum setting with the CRT CP ring, etc.
(Refer to following drawings.)



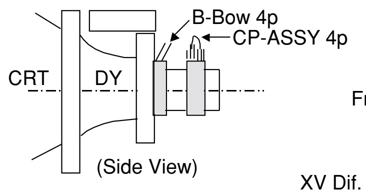
Vertical convergence


Horizontal convergence

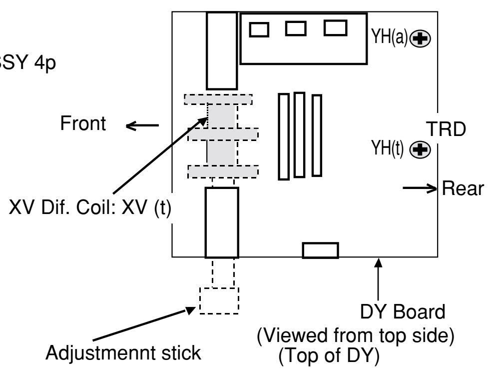
Adjusting the center misconvergence and axial misconvergence

Adjustment item name	Problem	Adjustment point	Adjustment procedure
H-STATIC V-STATIC			Adjust to +/- 0.1mm or less with CP-ASSY 4P.
YH axial deviation			Adjust so that TOP+BOTTOM are +/- 0.1mm or less with YH volume.
YV axial deviation			Adjustment making much of horizontal trapezoidal distortion Adjust optimally using DY left/right shaking YV volume. The remaining YV misconvergence should be adjusted with DDCP.
XH axial deviation			Adjust so that LEFT-RIGHT is +/- 0.1mm or less with XH slider.
XV characteristics			Only when XV (B-Bow) is +/- 0.15mm or more, adjust so that LEFT-RIGHT is +/- 0.15mm or less with the interlock of B-Bow 4P and CP-ASSY 4P.
XV axial deviation			Adjust so that LEFT+RIGHT is +/- 0.15mm or less with XV differential coil.

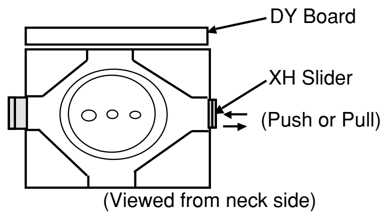
B-Bow 4p and CP-ASSY 4p



Correction Method



XH Slider

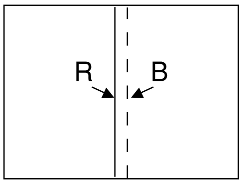
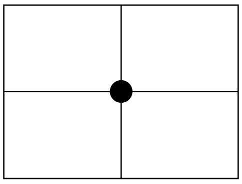
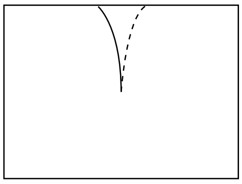
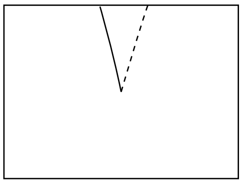
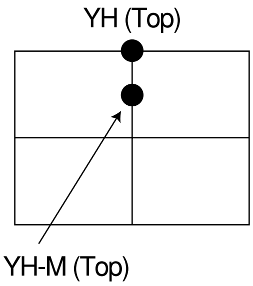
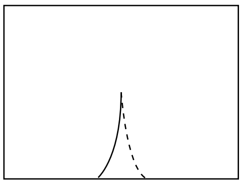
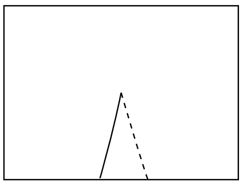
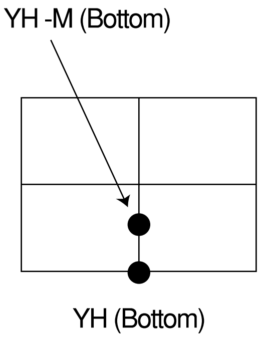
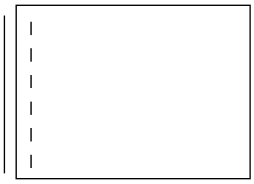
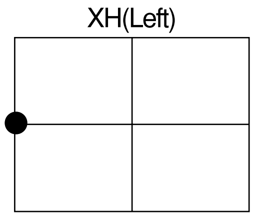
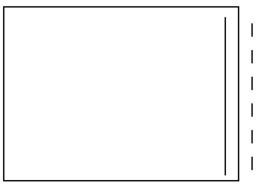
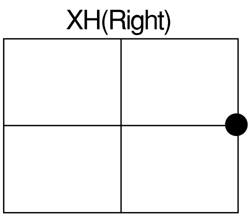


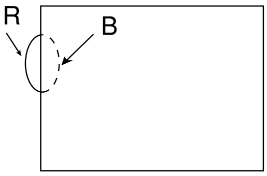
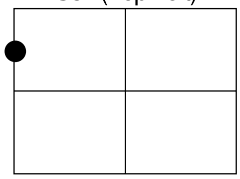
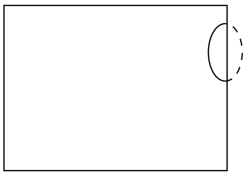
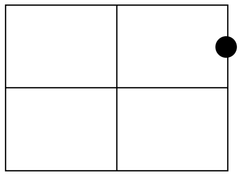
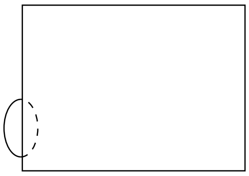
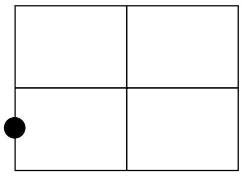
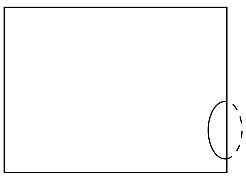
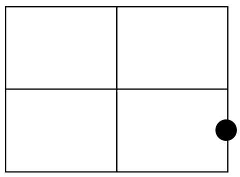
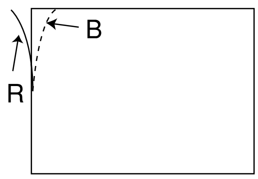
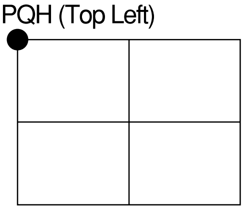
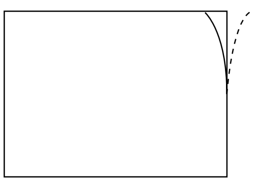
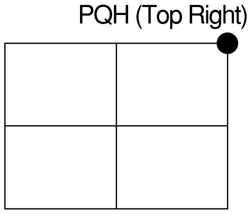
2.4.8.2 Adjusting DDCP

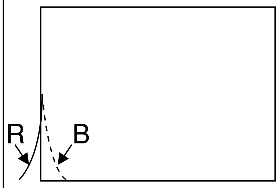
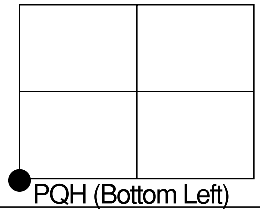
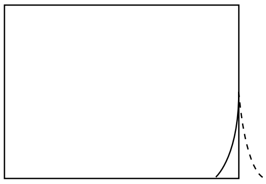
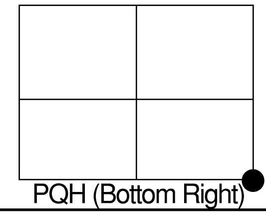
(1) Input the timing No. 12 (106.25kHz/85Hz,1600x1200) crosshatch pattern.

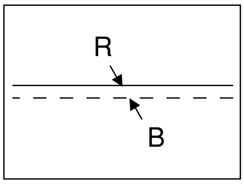
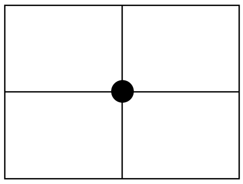
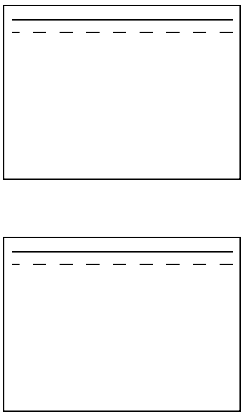
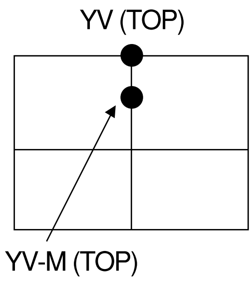
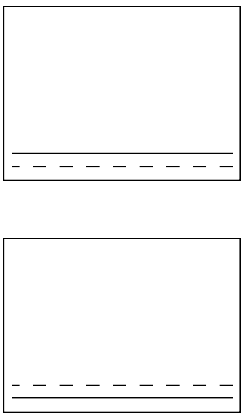
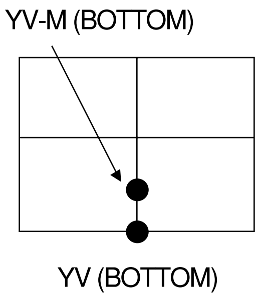
(2) Enter the factory mode.

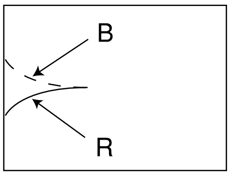
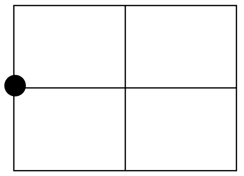
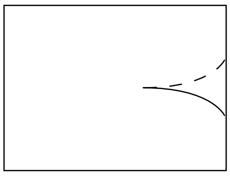
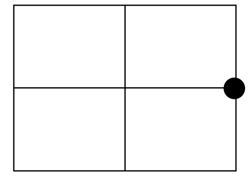
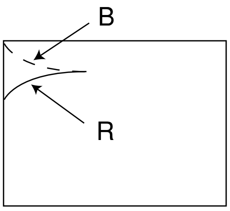
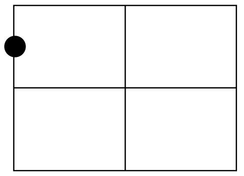
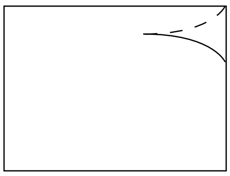
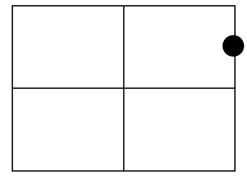
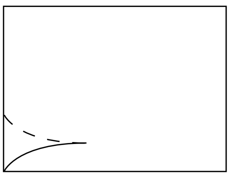
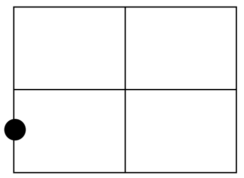
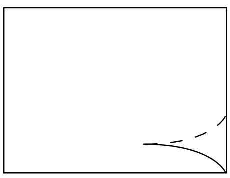
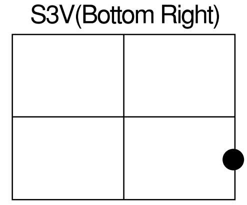
(3) Adjust in the following order. (It is assumed that the center and axial misconvergence on the previous page have already been adjusted.)

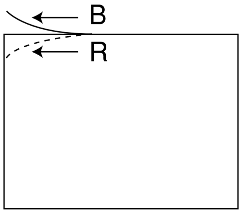
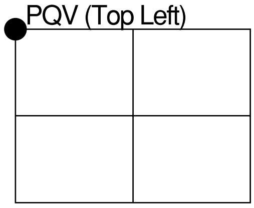
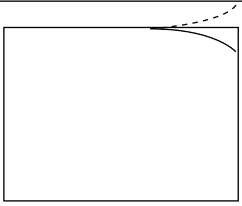
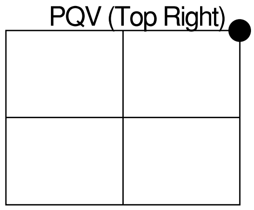
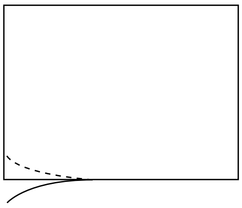
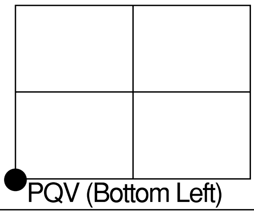
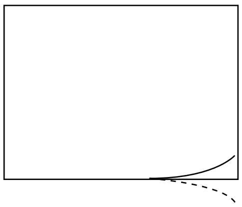
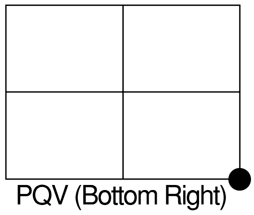
Adjustment order	Adjustment item name	Problem	Adjustment point	Adjustment procedure
4H-COIL				
1	CONVERGENCE HOR.			Adjust to 0.05mm or less. (Adjustment target is 0mm.)
2	YH-TT YH-JT	 		Adjust YH (Top) to 0.05mm or less with balance adjustment of YH-TT and YH-JT. (Adjustment target is 0mm.) (NOTE) The operating amount at YH-M(Top) when moving YH-TT and YH-JT : YH-TT < YH-JT
3	YH-TB YH-JB	 		Adjust YH (Bottom) to 0.05mm or less with balance adjustment of YH-TB and YH-JB. (Adjustment target is 0mm.) (NOTE) The operating amount at YH-M (Bottom) when moving YH-TB and YH-JB : YH-TB < YH-JB
4	XH-L			Adjust to 0.1mm or less.
5	XH-R			Adjust to 0.1mm or less.

Adjustment order	Adjustment item name	Problem	Adjustment point	Adjustment procedure
4H-COIL				
6	S3H-TL		S3H(Top Left) 	Adjust to 0.3mm or less.
7	S3H-TR		S3H(Top Right) 	Adjust to 0.3mm or less.
8	S3H-BL		S3H(Bottom Left) 	Adjust to 0.3mm or less.
9	S3H-BR		S3H(Bottom Right) 	Adjust to 0.3mm or less.
10	PQH-TL		PQH (Top Left) 	Adjust to 0.3mm or less.
11	PQH-TR		PQH (Top Right) 	Adjust to 0.3mm or less.

Adjustment order	Adjustment item name	Problem	Adjustment point	Adjustment procedure
4H-COIL				
12	PQH-BL			Adjust to 0.3mm or less.
13	PQH-BR			Adjust to 0.3mm or less.

Adjustment order	Adjustment item name	Problem	Adjustment point	Adjustment procedure
4V-COIL				
1	CONVERGENCE VER.			Adjust to 0.05mm or less. (Adjustment target is 0mm.)
2	YV-TT YV-JT			Adjust YV (Top) to 0.05mm or less with balance adjustment of YV-TT and YV-JT. (Adjustment target is 0mm.) (Note) The operating amount at YV-M (Top) when moving YV-TT and YV-JT. YV-TT<YV-JT
3	YV-TB YV-JB			Adjust YV (Bottom) to 0.05mm or less with balance adjustment of YV-TB and YV-JB. (Adjustment target is 0mm.) (Note) The operating amount at YV-M (Bottom) when moving YV-TB and YV-JB. YV-TB<YV-JB

Adjustment order	Adjustment item name	Problem	Adjustment point	Adjustment procedure
4V-COIL				
4	XV-L		XV(Left) 	Adjust to 0.1mm or less.
5	XV-R		XV(Right) 	Adjust to 0.1mm or less.
6	S3V-TL		S3V(Top Left) 	Adjust to 0.3mm or less.
7	S3V-TR		S3V(Top Right) 	Adjust to 0.3mm or less.
8	S3V-BL		S3V(Bottom Left) 	Adjust to 0.3mm or less.
9	S3V-BR		S3V(Bottom Right) 	Adjust to 0.3mm or less.

Adjustment order	Adjustment item name	Problem	Adjustment point	Adjustment procedure
4V-COIL				
10	PQV-TL			Adjust to 0.3mm or less.
11	PQV-TR			Adjust to 0.3mm or less.
12	PQV-BL			Adjust to 0.3mm or less.
13	PQV-BR			Adjust to 0.3mm or less.

* Specify the adjustment value range of the following adjustment items in general DDCP adjustment.

Adjustment items	Adjustment value range (Factory mode))
CONVERGENCE (HOR.)	2Bh (43) - D3h (211) (OSM display value=DAC output value)
CONVERGENCE (VER.)	47h (71) - B7h (183) (OSM display value=DAC output value)

2.4.9 Default settings (With factory mode)

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Default settings	Factory mode	Each adjustment timing

(1) Set the default values as shown in the table (user mode) given in OSM display (Refer to 2.3.2.1 User mode).
If the setting class is an item with each timing, carry out with each adjustment timing.
(2) Return to the user mode with the front panel.
(3) Execute FACTORY PRESET to confirm that each OSM setting is as shown in the table (user mode) given in OSM display (Refer to 2.3.2.1 User mode).
Only CONTRAST will be set to 100% when RESET button is pressed in the normal mode.
(4) How to set OSM BRIGHTNESS RESET value (30.1%) in user mode.
(a) Change to FACTORY MODE in advance.
(b) Set the counter of FACT DATA on OSM to 99 using (-) (+) buttons, and push SELECT button.
(c) Using (◀) (▶) buttons to set ADDR to 0B1.
(d) Using (-) (+) buttons set DATA to 04D.
(e) Press EXIT button to record 04D set in (d) mentioned above.
(f) To disable this rewriting function, turn the power OFF (FACTORY MODE is still alive even if the power was turned OFF).

Return to USER MODE.
Select BRIGHTNESS with OSM, and press RESET button, then the data (04D = 30.1%) set in (d) mentioned above is called.
(For your information; when (-) and (+) buttons are pressed simultaneously, the data is set to 50%.)
(5) After setting the default values, turn the power button OFF.

2.5 Inspections (In normal mode)

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Inspections	Normal mode	

2.5.1 Electrical performance

Inspect the electrical performance after confirming that the contrast is set to MAX and the bright is set to center (by pressing (-) (+) buttons simultaneously).
After inspection, carry out FACTORY PRESET operation.

2.5.1.1 Withstand voltage

There must be no abnormality when 1500VAC is applied for two seconds between both ends of the AC input terminal and chassis, and between the DG coil terminal and chassis.
The cut-off current should be 20mA.

2.5.1.2 Grounding conductivity check

Check that the resistance value is 100ohms or less when 25A is passed between the AC input terminal grounding GND and chassis GND.

2.5.1.3 Degaussing coil operation

Confirm that when OSM DEGAUSS is executed, the picture vibrates and then stops.

2.5.1.4 IPM OFF MODE function operation (Set the AC power input to 230V)

Confirmation timing
Timing No. 12 (106.25kHz / 85Hz, 1600x1200)

Use the full white pattern without R, G, B signals.
Select IPM OFF MODE from OSM, and set to 1:ENABLE.

(1) IPM OFF MODE ENABLE

(a) Confirm that when H and V SYNCs are removed, the system waits for approx. five seconds, displays IPM OFF MODE for approx. three seconds, and then the picture dark ens.
Also confirm that Power Indicator changes to orange and the power consumption is as follows.

Power consumption	2W or less

(b) Confirm that when H and V SYNCs are input again, the high voltage is recovered, and the picture appears in approx. five seconds.

2.5.1.5 Confirming the GLOBAL SYNC (CORNER-Purity) function

Confirmation timing
Timing No. 12 (106.25kHz / 85Hz, 1600x1200)

Input a (full white display), and press (-)(+) buttons to change GLOBAL SYNC (TR/TL/BR/BL). Confirm that the color coordination around the picture changes.

2.5.1.6 Focus, picture performance

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Focus, picture performance		Check timing No.5, "e" character reverse display Check timing No.6, chrosshatch normal display

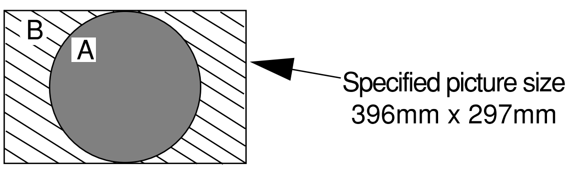
The picture must be evenly bright with check timing No. 5 "e" character reverse display and check timing No. 6 chosshatch normal display.

2.5.1.7 Misconvergence

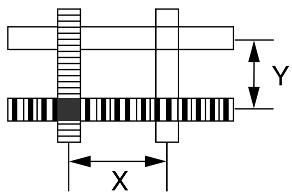
After heat running for 20 minutes or more, the mis-convergence amount in the horizontal and vertical directions must be below the following values.
The mis-convergence amount is the value between the two colors of R, G and B separated the most in the horizontal (X) and vertical (Y) directions when a 15 vertical lines x 11 horizontal lines crosshatch is displayed.
This adjustment should be carried out with the convergence meter MINOLTA CC-100.

Zone	Mis-convergence amount				
A	0.25mm or less				
B	0.35mm or less				
Measurement timing (Timing No.)	12				

<Zone>



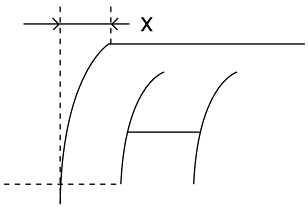
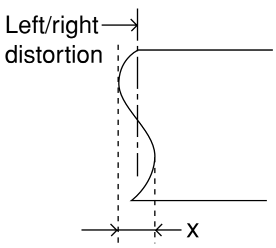
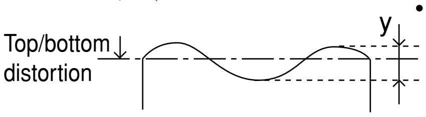
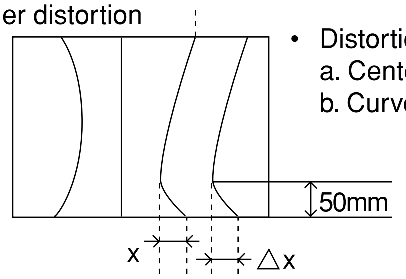
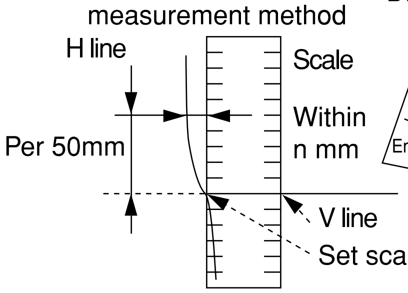
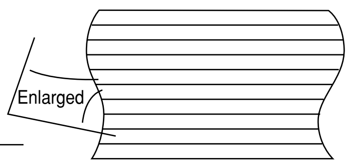
<Mis-convergence amount>

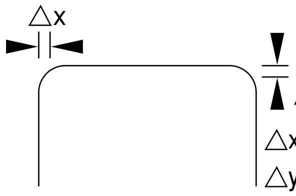
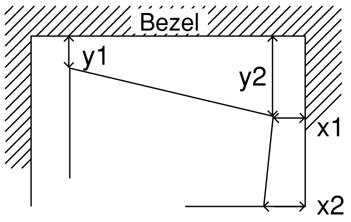
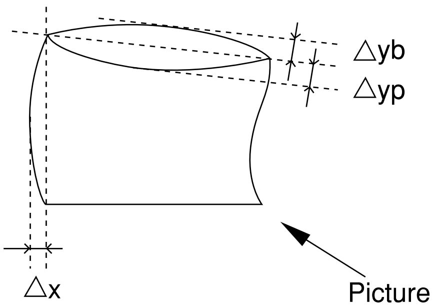
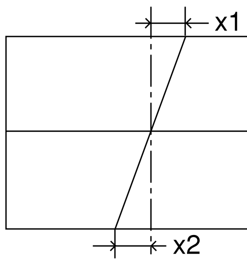
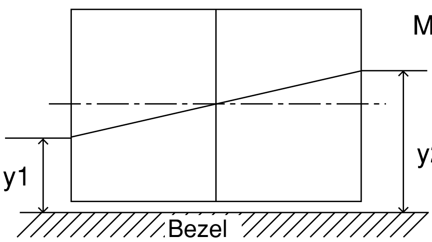


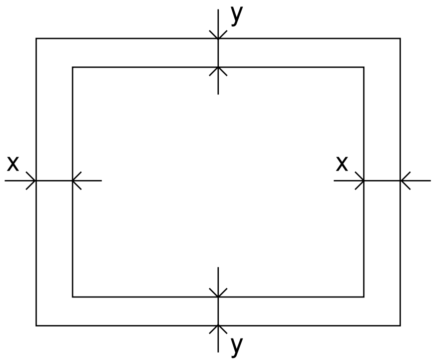
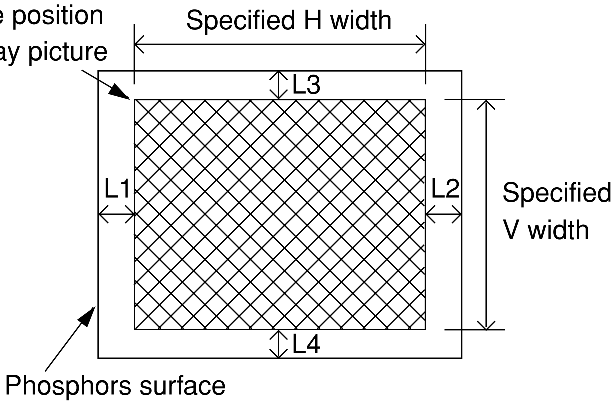
2.5.1.8 Picture distortion

When the picture distortion is measured, each distortion of the preset timing must be less than the following values.

<Picture performance inspection items> Inspect the following items for the picture distortion.

No.	Item	Judgement reference value	Input signal
1.	4-corner section distortion Inspect the distortion at the four corners. • Signal, H character with frame (both normal/reverse)  • Distortion x: Distortion in the range of one H character height. Judge with the white display G. (Judge the distortion amount with a fluorescent material stripe.)	x ≦ 1pitch (=0.3mm)	H character with frame (both normal/ reverse)
2.	4-edge distortion When S-character or seagull type high frequency distortion is visible, check with the following method.  • Distortion x of S-character seagull, etc.: Distortion excluding normal pin, barrel or trapezoid.  • Distortion y: High frequency distortion excluding trapezoid.	x ≦ 0.6mm * Note y ≦ 1.0mm	Crosshatch pattern
3.	Inner distortion  • Distortion x: a. Center line b. Curve of other vertical line Vertical line △X measurement method  • Distortion△x:Curve within 50mm range 	a. x ≦ 1.0mm (*) b. x ≦ 1.5mm (*) Preset No.1 (31.5kHz, 60Hz) is: a. x ≦ 1.5mm b. x ≦ 2.0mm △x ≦ 0.9mm	

No.	Item	Judgement reference value	Input signal
4.	Line curve (crosshatch pattern outer contour)  △x: Curve within 50mm range (horizontal) △y: Curve within 50mm range (vertical)	△x ≦1.0mm △y ≦1.0mm	Crosshatch pattern
5.	Horizontal trapezoid (top/bottom), vertical trapezoid (left/right)  • △y=|y1-y2| △x=|x1-x2| • Control with the above right value for each the top, bottom, left and right.	△y ≦2.0mm △x ≦1.8mm	
6.	Top/bottom pin and barrel, left/right pin and barrel 	△yb ≦ 1.3mm △yp ≦ 1.5mm △x ≦1.0mm	
7.	Parallelogram distortion  Measure the larger of x1 and x2.	x ≦0.8mm	
8.	Inclination  Measure △y = |y1-y2|.	△y ≦2.0mm	

No.	Item	Judgement reference value	Input signal
9.	Distortion Must be within the following frame.* (Note, excluding ROTATION) 	y ≦ 2.0mm x ≦ 2.0mm	Crosshatch pattern
10.	Picture position 	|L1-L2| ≦ 5.0mm |L3-L4| ≦ 3.0mm	Full white

2.5.1.9 Linearity

Measure the linearity with a 17 horizontal line x 13 vertical line crosshatch.

Horizontal linearity :	fH=30-40kHz	whole : 15% or less, adjacent :	7% or less
	fH=40-60kHz	whole : 12% or less, adjacent :	7% or less
	fH=60-115kHz	whole : 10% or less, adjacent :	7% or less
Vertical linearity :		whole : 10% or less, adjacent :	7% or less

Calculation expression : $\frac{(Xmax - Xmin)}{(Xmax + Xmin)/2} \times 100(\%)$

* If any doubts arise about the judgment, judge with the horizontal/vertical width tolerance of ±3mm, picture position: |L1-L2|≤3.0mm and |L3-L4|≤3.0mm.

2.5.1.10 Adjustment value list

The horizontal width, vertical width and DBF-H/V amplitude must be within the following ranges.

Timing	Horizontal width (mm)	Vertical width (mm)	DBF-H amplitude (H)		DBF-V amplitude (V)	
No.	Adj. value	Adj. value	Standard Adj. value	Max. Adj. value	Standard Adj. value	Max. Adj. value
1						
2	396±5	297±4	400±5	430	135±20	200
3						
4						
5	396±5	297±4	400±5	430	135±20	200
6						
7	396±5	297±4	400±5	430	135±20	200
8	396±5	297±4	400±5	430	135±20	200
9	396±5	297±4	400±5	430	135±20	200
10	396±5	297±4	400±5	430	135±20	200
11	396±5	297±4	400±5	430	135±20	200
12	396±5	297±4	400±5	430	135±20	200
13						
14						
15	396±5	297±4	400±5	430	135±20	200
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

Standard adjustment value: in case of determining DBF voltage
Maximum adjustment value: the value impossible to set the maximum of DBF voltage

2.5.1.11 Checking the functions during Composite Sync input

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Checking the functions during Composite Sync input		Check 2 : 35kHz / 66Hz
			Full white

[Composite Sync]
Timing: Check 2 (35kHz/66Hz), full white

In the normal mode, input the above timing to confirm that the operation is normal.

2.5.1.12 Confirming the reset operation

Confirmation timing
Timing No. 12 (106.25kHz / 85Hz, 1600x1200)

After varying NARROW/WIDE somewhat, press RESET button to confirm that the data returns to the original value.

2.5.1.13 Confirming the full white luminance/color coordination

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Confirming the full white luminance / color coodination	Factory mode	No.12: 106.25kHz / 85Hz, 1600x1200
			Full white

Timing No. 12 (106.25kHz/85Hz, 1600x1200), input amplitude = 0.7Vp-p, BRIGHT : 7F (50%)
Confirm that the full white luminance/color coordination is the following value.

*9300K: should be confirmed with COLOR 1.
*5000K: should be confirmed with COLOR 5.
*6500K: should be confirmed using color temperature 6500K with color temperture adjust ment ().

Confirmed item		9300K	6500K	5000K
Luminance		105 or more	90 or more	77 or more
Color temperature	x	0.283±0.007	0.313±0.007	0.345±0.007
	y	0.297±0.007	0.329±0.007	0.359±0.007

Confirmation of OSM color temperature (9300K)
x=0.283±0.04 Y=0.297±0.05
*Confirmation should be carried out at white section on OSM picture.

2.5.1.14 Confirming CONVERGENCE compensation function

Confirm that CONVERGENCE changes by varying CONVERGENCE (HOR.) and CONVERGENCE (VER.).

2.5.1.15 Confirming ROTATION compensation function

Confirm that the picture rorates by changing ROTATE.

2.5.1.16 Luminance/color coordination uniformity

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Lluminance/color coordination uniformity		No.12: 106.25kHz / 85Hz, 1600x1200

The luminance ratio between the center and periphery must be 80% or more with timing No. 12 (106.25kHz/85Hz, 1600x1200) COLOR 1.
The color coordination difference between the center and periphery must be $\Delta x, y < \pm 0.012$ with COLOR 1.

2.5.1.17 Confirming the color tracking

Status indicator	Adjustment item	Adjustment mode/set	Imput signal/pattern
	Confirming color tracking	Factory mode	No.12 : 106.25kHz/85Hz, 1600x1200
			BRIGHTNESS : 7F (50%)

Confirm with the timing No. 12 (106.25kHz/85Hz, 1600x1200), BRIGHTNESS : 7F (50%) and COLOR1 (9300K) in factory mode.
Measure the color coordination at the center of the picture using a full white pattern (input amplitude = 0.7Vp-p).
Confirm that the color coordination change is within the ±0.015 range when the CONTRAST is set to 25cd/m^2 with OSM.

2.5.1.18 CRT installation position

CRT installation position tolerance   Within ±3mm in vertical direction Within ±2.5mm in horizontal direction
Inclination: Within ±2.5mm at bezel reference

2.5.1.19 Confirming SB MODE operation

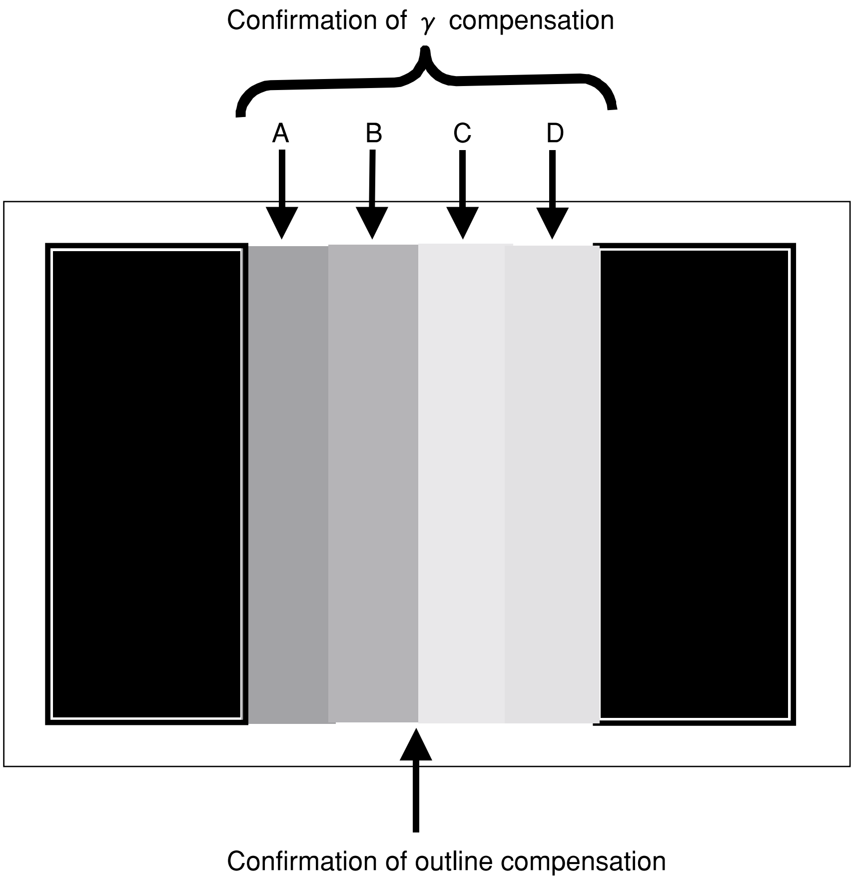
Timing No.12 (106.25kHz/85Hz, 1600x1200)
Input amplitude = 0.7Vp-p (white window)
The following items should be confirmed with CONTRAST: MAX and BRIGHTNESS: 50%.

SB MODE	Confirmation item		9300K
SB-MODE2	W-Window luminance		150 or more
	W-Window color coordination	x	0.283±0.015
		y	0.297±0.015
	Back raster luminance		Approx. 0.8cd/m^2

* Confirm that the color is not saturated with the white window picture during SB MODE2 operating.
* Confirm the following items during SB MODE2 operating.

(1) Compensation of γ:
Confirm that A and B of the following test pattern become similar black color.
Confirm that C and D of the following test pattern become similar white color.

(2) Compensation of outline:
Confirm that the overshoot (ringing) appears on the left edge of C of the following test pattern.

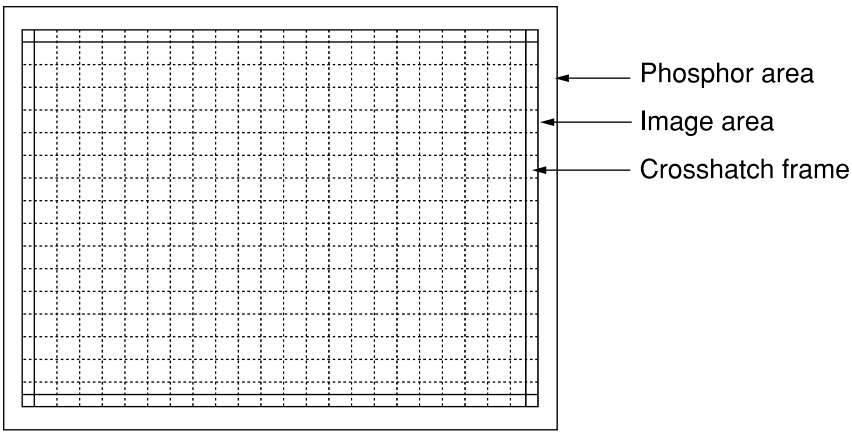


2.5.1.20 Confirming AUTO-ADJUST operation

(Timing No. 22 (114kHz/85Hz, 1600X1280))

(1) Select AUTO ADJUST with OSM in user mode, and press (+) button.

(2) Confirm that AUTO ADJUST function operates and the crosshatch frame should be within phosphor area.



2.5.1.21 Others

(1) When any button is pressed, the changes must be smooth, and there must be no abnormalities such as noise.

(2) Synchronization must not flow when the power button is turned ON and OFF.

(3) Confirm that Power Indicator is lit.

2.6 DDC function, check of asset management

This writing operation should be carried out with the service tool (refer to the followings for detail of service tool).

The version of the service tool software used is as follows.

Service tool S/W folder name: SVT312NM210

Service tool S/W version: Ver3.12-2.1-0

Be sure to read “Read me first” first in using the service tool.

For concrete use, refer to the service tool manual attached to the service tool.

Lower 5 digits of S/N → converted to hex. Numbers → registered in ascending order
Upper 3 digits of S/N → 0 (according to VESA standard)

(Ex.) 512002978 → 00000BA2 → Models having NO ASSET function / Models having ASSET function

MPU side Address (H)	Dedicated EEPROM side Address (H)	Data (H)
78C	0C	A2
78D	0D	0B
78E	0E	00
78F	0F	00

[ASCII conversion]

Using the barcode system read the serial numbers (9 digits) assigned at NMV (Nagasaki), then establish the serial number through the following conversion.

S/N → converted to ASCII code → registered (to Monitor Descriptor #4) in descending order

(ex.) 512A02978
↓
35 31 32 41 30 32 39 37 38
↓
Models having NO ASSET function / Models having ASSET function

MPU side Address (H)	Dedicated EEPROM side Address (H)	Data (H)
E81	71	35
E82	72	31
E83	73	32
E84	74	41
E85	75	30
E86	76	32
E87	77	39
E88	78	37
E89	79	38
E8A	7A	0A → shows the end of S/N data*
E8B	7B	20 → shows blank*
E8C	7C	20 → shows blank*
E8D	7D	20 → shows blank*

*Fixed data (set according to the number of digits of S/N)

2.6.1 DDC write data contents

The contents of DDC write data must be as follows.

EDID DATA DUMP HEX
00 FF FF FF FF FF FF 00
34 AC 31 46 SN SN SN SN
WW YY 01 03 0C 28 1E 78
EB 9C 68 A0 57 4A 9B 26
12 48 4C FF EF 80 31 59
45 59 61 59 71 4F 81 99
A9 4F C1 4F D1 4F A6 59
40 30 62 B0 32 40 40 C0
13 00 8C 29 11 00 00 1E
00 00 00 FD 00 32 A0 1E
73 21 00 0A 20 20 20 20
20 20 00 00 00 FC 00 44
50 6C 75 73 20 32 33 30
53 42 0A 20 00 00 00 FF
00 S2 S2 S2 S2 S2 S2 S2
S2 S2 S2 S2 S2 S2 00 CS

SN: Serial number
WW: Week of Manufacture
YY: Year of Manufacture
S2: ASCII Serial Number
CS: Check Sum

-- EDID DATA DUMP TEXT --
Manufacturer Code: MEL
Product Code (HEX): 4631
Product Code (DEC): 17969
(Microsoft INF ID: MEL4631)
Serial Number (HEX): SN
Week of Manuf: WW
Year of Manuf: YY

EDID Version: 1
EDID Revision: 3
Extension Flag: 0

Video:
Input Singal: ANALOG
Setup: NO
Sync on Green: NO
Composite Sync: YES
Separate Sync: YES
V Sync Serration: NO
V Signal Level:
0.700V/0.300V (1V p-p)

Max Image Size H: 40 cm
Max Image Size V: 30 cm
DPMS Stand By: YES
DPMS Suspend: YES
DPMS Active Off: YES
GTF Support: YES
Standard Default Color Space: NO
Preferred Timing Mode: YES
Display Type: RGB Color

Color:
Gamma: 2.20
Red x: 0.627
Red y: 0.341
Green x: 0.292
Green y: 0.605
Blue x: 0.149
Blue y: 0.072
White x: 0.283
White y: 0.297

Established Timings:
720x400 @ 70 Hz
720x400 @ 88 Hz
640x480 @ 60 Hz
640x480 @ 67 Hz
640x480 @ 72 Hz
640x480 @ 75 Hz
800x600 @ 56 Hz
800x600 @ 60 Hz
800x600 @ 72 Hz
800x600 @ 75 Hz
832x624 @ 75 Hz
1024x768 @ 60 Hz
1024x768 @ 70 Hz
1024x768 @ 75 Hz
1152x870 @ 75 Hz
1280x1024 @ 75 Hz

Standard Timing #1:
Horizontal Active Pixels: 640
Aspect Ratio: 4:3
(480 active lines)
Refresh Rate: 85 Hz

Standard Timing #2:
Horizontal Active Pixels: 800
Aspect Ratio: 4:3
(600 active lines)
Refresh Rate: 85 Hz

Standard Timing #3:
Horizontal Active Pixels: 1024
Aspect Ratio: 4:3
(768 active lines)
Refresh Rate: 85 Hz

Standard Timing #4:
Horizontal Active Pixels: 1152
Aspect Ratio: 4:3
(864 active lines)
Refresh Rate: 75 Hz

Standard Timing #5:
Horizontal Active Pixels: 1280
Aspect Ratio: 5:4
(1024 active lines)
Refresh Rate: 85 Hz

Standard Timing #6:
Horizontal Active Pixels: 1600
Aspect Ratio: 4:3
(1200 active lines)
Refresh Rate: 75 Hz

Standard Timing #7:
Horizontal Active Pixels: 1792
Aspect Ratio: 4:3
(1344 active lines)
Refresh Rate: 75 Hz

Standard Timing #8:
Horizontal Active Pixels: 1920
Aspect Ratio: 4:3
(1440 active lines)
Refresh Rate: 75 Hz

Detailed Timing (block #1): ---Preferred Timing Mode---
Pixel Clock: 229.50 MHz
Horizontal Active: 1600 pixels
Horizontal Blanking: 560 pixels
Vertical Active: 1200 lines
Vertical Blanking: 50 lines
(Horizontal Frequency: 106.25 kHz)
(Vertical Frequency: 85.0 Hz)
Horizontal Sync Offset: 64 pixels
Horizontal Sync Width: 192 pixels
Vertical Sync Offset: 1 line
Vertical Sync Width: 3 lines
Horizontal Border: 0 pixel
Vertical Border: 0 line
Horizontal Image Size: 396 mm
Vertical Image Size: 297 mm
Interlaced: NO
Image: Normal Display
Sync: Digital Separate
Bit 1: ON
Bit 2: ON

Monitor Range Limits (block #2):
Minimum Vertical Rate: 50 Hz
Maximum Vertical Rate: 160 Hz
Minimum Horizontal Rate: 30 kHz
Maximum Horizontal Rate: 115 kHz
Maximum Pixel Clock: 330 MHz
GTF Data: 00 0a 20 20 20 20 20 20

Monitor Name (block #3):
DPlus 230SB

Monitor Serial Number (block #4): S2

SN: Serial number
WW: Week of Manufacture
YY: Year of Manufacture
S2: ASCII Serial Number

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2.6.2 Self-diagnosis shipment setting

The shipment settings for self-diagnosis data area (region) are given below.

ADR	Shipment Setting (H)	LABEL NAME
0x08C to 0x08F	0x00	Heater operating time
0x0B6 to 0x0B9	0x00	Operating time
0x0C0	0x00	High voltage error rate
0x0C1	0x00	High voltage suspension rate
0x0C2	0x00	Short circuit rate
0x0C3	0x00	High voltage data error rate
0x0C4	0x00	Deflection suspension rate
0x0C5	0x00	Heater error rate
0x0C6	0x00	ABL error

2.7 Default inspection

2.7.1 Default setting of switches

Confirm that the following switch is set as follows.

(1) Power switch: OFF

2.7.2 Default setting of OSM

Confirm that each OSM setting is as shown in OSM display (section 2.3.3) table (user mode/ factory mode).

If the setting class is an item for each timing, carry out for each adjustment timing.

* Only CONTRAST will be set to MAX (100%) when RESET button is pressed in the normal mode.

2.7.3 Checking the labels

Confirm that the "SERVICEMAN WARNING", "rating label", "manufacturing date stamp", "SERIAL NO. label", etc., are attached to the specified position, and have been checked.

2.7.4 Packaging

(1) There must be no remarkable contamination, tearing or scratches, etc.
(2) The model name must be accurately displayed.
(3) The SERIAL NO. must be attached. (Must be the same No. as the set.)
(4) The package must be accurately sealed.

2.8 Degaussing with handy-demagnetizer

2.8.1 General precautions

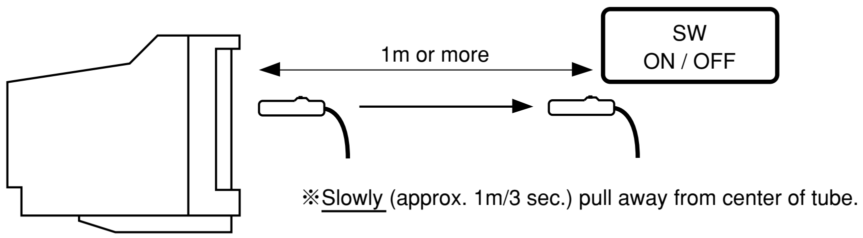
(1) Carry this procedure out with the monitor power ON.
(2) When degaussing with handy-demagnetizer, the demagnetizer power must be turned ON and OFF at a position at least 1m away from CRT tube.
(3) Use a bar type demagnetizer instead of a ring type.
Carefully and slowly (1m/3 sec.) demagnetize the CRT tube and bezel side surface.
When separating the degaussing coil at the end, separate as slow as possible with the following procedure.
If separated quickly, stripes could remain at the picture corners.

2.8.2 How to hold and use the handy-demagnetizer

(1) Approach the demagnetizer as carefully and slowly (approx. 1m/3 sec.) as possible, and move around the bezel side periphery two to three times.
(2) Next, gradually (approx. 1m/3 sec.) move to the CRT tube side, and move around the CRT tube four to five times with the following procedure.
(3) Finally, leave the CRT tube as slowly (approx. 1m/3 sec.) as possible, and turn the handy-demagnetizer unit switch OFF at a position 1 to 1.5m away.

(NOTE): The monitor should be degaussed as whichever following conditions.
(1) Degauss by handy demagnetizer in off condition.
(2) Degauss by handy demagnetizer in power management condition.
(3) Degauss by handy demagnetizer with monitor set degauss operation.

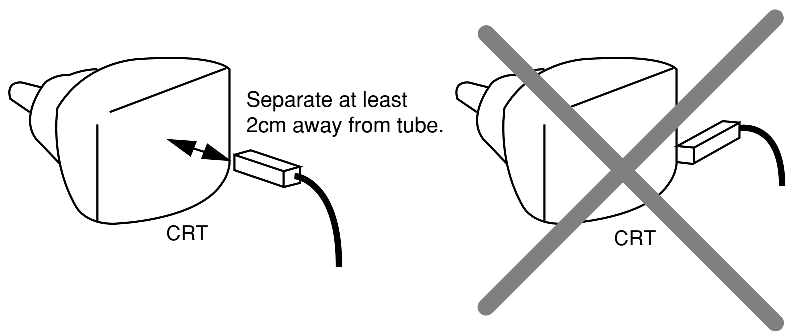
Looking from side of set



<Holding the handy - demagnetizer>

Face the handy - demagnetizer so that the longitudinal direction is vertical in respect to the CRT.

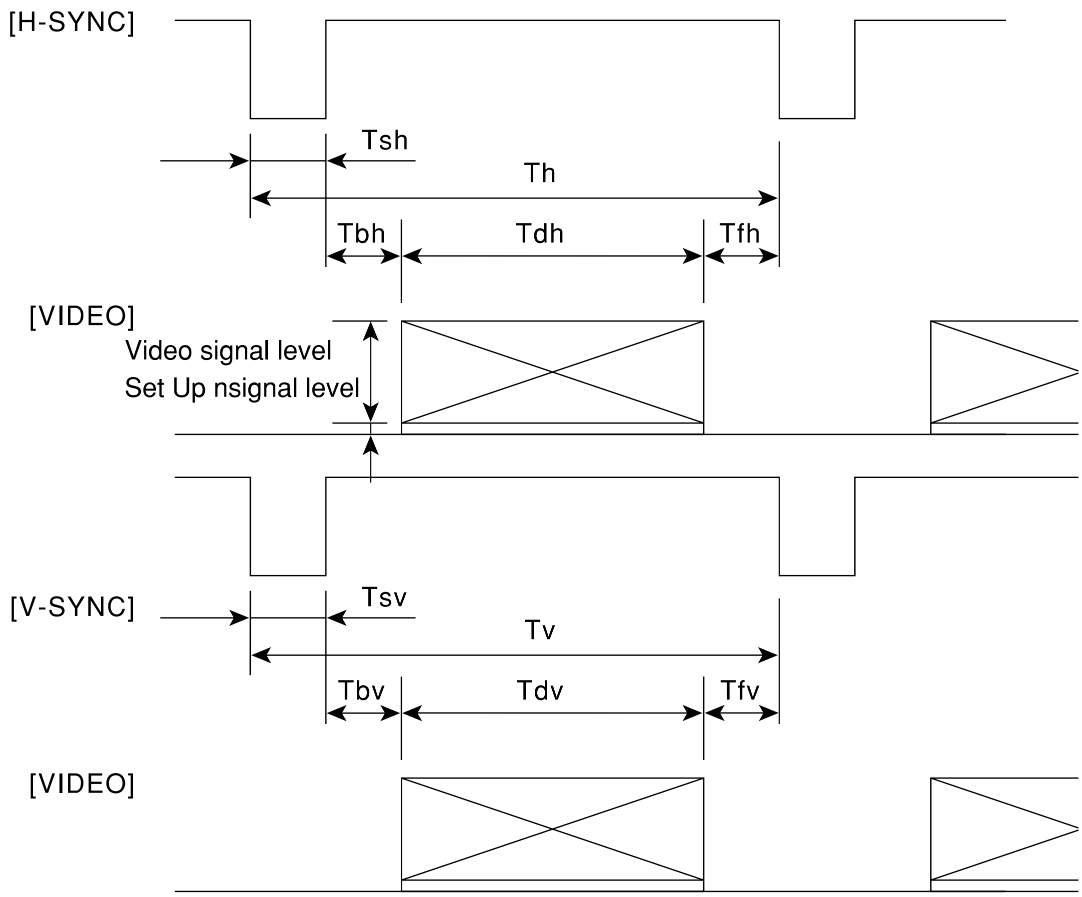
Do not hold the handy - demagnetizer so that the longitudinal direction is parallel in respect to the CRT.



2.9 Caution

Do not input the user timing before factory adjustments.
(The automatic tracking of the FOCUS could be adversely affected.)

2.10 Timing chart



※Refer to after the next page for the preset timing details.

2.11 Adjustment timing

NO	Fh (kHz)	Clock (MHz)	Th (µSEC) (dot)	Tsh (µSEC) (dot)	Tfh (µSEC) (dot)	Tbh (µSEC) (dot)	Tdh (µSEC) (dot)	Fv (Hz)	Tv (mSEC) (line)	Tsv (mSEC) (line)	Tfv (mSEC) (line)	Tbv (mSEC) (line)	Tdv (mSEC) (line)	Hs	Vs	VIDEO level (V)	set up level (V)	Serra- tion			Remarks
Check 1	35		28.571	3.500	1.891	4.000	19.180	66.70	15.000	0.086	1.485	2.000	11.428	S/G		0.7	-	-			Check 1
Check 2	35		28.571	3.500	1.891	4.000	19.180	66.70	15.000	0.086	1.485	2.000	11.428	Com posite		0.7	-	1H			Check 2
Check 4	106.250	229.500	9.412	0.837	0.279	1.325	6.972	85.000	11.765	0.028	0.009	0.433	11.294	+	-	0.7	-	-			Check 4 (1600*1200)85Hz
Check 5	106.250	220.72	9.41	0.87	0.09	1.20	7.25	85.000	11.765	0.028	0.009	0.433	11.294	-	-	0.7	-	-			Check5 106kHz85Hz, Horizontal 77%
Check 6	106.250	236.02	9.41	0.87	0.38	1.38	6.78	85.000	11.765	0.028	0.009	0.433	11.294	-	+	0.7	-	-			Check6 106kHz85Hz, Horizontal 72%
A	30		33.333	4.000	0.833	2.500	26.000	70.10	14.268	0.064	1.176	1.906	11.122	+	-	0.7	-	-			

NO	Fh (kHz)	Clock (MHz)	Th (µSEC) (dot)	Tsh (µSEC) (dot)	Tfh (µSEC) (dot)	Tbh (µSEC) (dot)	Tdh (µSEC) (dot)	Utili-zation	H re-trace s+f+b	Fv (Hz)	Tv (mSEC) (line)	Tsv (mSEC) (line)	Tfv (mSEC) (line)	Tbv (mSEC) (line)	Tdv (mSEC) (line)	V re-trace	Hs	Vs	VIDEO level (V)	set up level (V)	Serra-tion				Remarks
1	31.470	28.322	31.777 (800)	3.813 (96)	0.635 (16)	1.907 (48)	25.422 (640)	80.00	6.356	70.090	14.268 (449)	0.064 (2)	0.381 (12)	1.112 (35)	12.711 (400)	1.557	-	+	0.7	-	-				ODS(720*400)70Hz
2	31.469	25.175	31.778 (800)	3.813 (96)	0.636 (16)	1.907 (48)	25.422 (640)	80.00	6.356	59.940	16.683 (525)	0.064 (2)	0.318 (10)	1.048 (33)	15.253 (480)	1.112	-	-	0.7	-	-	○1			VGA(640*480)60Hz
3	37.500	31.500	26.667 (840)	2.032 (64)	0.508 (16)	3.810 (120)	20.317 (640)	76.19	6.350	75.000	13.333 (500)	0.080 (3)	0.027 (1)	0.427 (16)	12.800 (480)	0.506	-	-	0.7	-	-				VESA(640*480)75Hz
4	43.269	36.000	23.111 (832)	1.556 (56)	1.556 (56)	2.222 (80)	17.778 (640)	76.92	5.334	85.008	11.764 (509)	0.069 (3)	0.023 (1)	0.579 (25)	11.093 (480)	0.647	-	-	0.7	-	-				VESA(640*480)85Hz
5	46.875	49.500	21.333 (1056)	1.616 (80)	0.323 (16)	3.232 (160)	16.162 (800)	75.76	5.171	75.000	13.333 (625)	0.064 (3)	0.021 (1)	0.448 (21)	12.800 (600)	0.512	+	+	0.7	-	-	○2			VESA(800*600)75Hz
6	53.674	56.250	18.631 (1048)	1.138 (64)	0.569 (32)	2.702 (152)	14.222 (800)	76.34	4.409	85.061	11.756 (631)	0.056 (3)	0.019 (1)	0.503 (27)	11.179 (600)	0.559	+	+	0.7	-					VESA(800*600)85Hz
7	60.023	78.750	16.660 (1312)	1.219 (96)	0.203 (16)	2.235 (176)	13.003 (1024)	78.05	3.657	75.029	13.328 (800)	0.050 (3)	0.017 (1)	0.466 (28)	12.795 (768)	0.516	+	+	0.7	-	-	○3			VESA(1024*768)75Hz
8	68.677	94.500	14.561 (1376)	1.016 (96)	0.508 (48)	2.201 (208)	10.836 (1024)	74.42	3.725	84.997	11.765 (808)	0.044 (3)	0.015 (1)	0.524 (36)	11.183 (768)	0.568	+	+	0.7	-	-	○4			VESA(1024*768)85Hz
9	79.976	135.000	12.504 (1688)	1.067 (144)	0.119 (16)	1.837 (248)	9.481 (1280)	75.82	3.023	75.025	13.329 (1066)	0.038 (3)	0.013 (1)	0.475 (38)	12.804 (1024)	0.513	+	+	0.7	-	-	○5			VESA(1280*1024)75Hz
10	91.146	157.500	10.971 (1728)	1.016 (160)	0.406 (64)	1.422 (224)	8.127 (1280)	74.08	2.844	85.027	11.761 (1072)	0.033 (3)	0.011 (1)	0.483 (44)	11.235 (1024)	0.516	+	+	0.7	-	-	○6			VESA(1280*1024)85Hz
11	93.750	202.500	10.667 (2160)	0.948 (192)	0.316 (64)	1.501 (304)	7.901 (1600)	74.07	2.765	75.000	13.333 (1250)	0.032 (3)	0.011 (1)	0.491 (46)	12.800 (1200)	0.523	+	+	0.7	-	-	○7			VESA(1600*1200)75Hz
12	106.250	229.500	9.412 (2160)	0.837 (192)	0.279 (64)	1.325 (304)	6.972 (1600)	74.08	2.441	85.000	11.765 (1250)	0.028 (3)	0.009 (1)	0.433 (46)	11.294 (1200)	0.461	+	+	0.7	-	-	○8			VESA(1600*1200)85Hz
13	106.270	261.00	9.41 (2456)	0.828 (216)	0.368 (96)	1.349 (352)	6.866 (1792)	72.96	2.545	74.997	13.334 (1417)	0.028 (3)	0.009 (1)	0.649 (69)	12.647 (1344)	0.677	-	+	0.7	-	-				VESA(1792*1344)75Hz
14	112.500	288.000	8.889 (2560)	0.778 (224)	0.444 (128)	1.222 (352)	6.444 (1856)	72.49	2.444	75.000	13.333 (1500)	0.027 (3)	0.009 (1)	0.924 (104)	12.373 (1392)	0.951	-	+	0.7	-	-				ESA(1856*1392)75Hz
15	112.500	297.000	8.889 (1640)	0.754 (224)	0.485 (144)	1.185 (352)	6.4654 (1920)	72.73	2.424	75.000	13.333 (1500)	0.027 (3)	0.009 (1)	0.498 (56)	12.800 (1440)	0.525	-	+	0.7	-	-	○9			VESA(1920*1440)75Hz
16	35.00	30.240	28.571 (864)	2.116 (64)	2.116 (64)	3.175 (96)	21.164 (640)	74.08	7.407	66.67	15.000 (525)	0.086 (3)	0.086 (3)	1.114 (39)	13.714 (480)	1.2	-	-	0.7	-	-				APPLE13(640*480)
17	49.710	57.270	20.115 (1152)	1.118 (64)	0.559 (32)	3.910 (224)	14.528 (832)	72.22	5.587	74.530	13.417 (667)	0.060 (3)	0.020 (1)	0.785 (39)	12.552 (624)	0.845	-	-	0.7	-	-				APPLE16(832*624)
18	60.240	80.000	16.600 (1328)	1.200 (96)	0.400 (32)	2.200 (176)	12.800 (1024)	77.11	3.800	74.930	13.346 (804)	0.050 (3)	0.049 (3)	0.498 (30)	12.749 (768)	0.548	-	-	0.7	-	-				APPLE19(1024*768)
19	68.680	100.000	14.560 (1456)	1.280 (128)	0.320 (32)	1.440 (144)	11.520 (1152)	79.12	3.040	75.060	13.322 (915)	0.044 (3)	0.043 (3)	0.568 (39)	12.667 (870)	0.612	-	-	0.7	-	-				APPLE21(1152*870)
20	100.200	219.638	9.980 (2192)	0.801 (176)	0.546 (120)	1.348 (296)	7.285 (1600)	73.00	2.695	75.000	13.333 (1336)	0.03 (3)	0.01 (1)	0.519 (52)	12.774 (1280)	0.549	-	-	0.7	-	-				GTF(1600*1280)75Hz
21	107.200	234.982	9.328 (2192)	0.749 (176)	0.511 (120)	1.260 (296)	6.809 (1600)	73.00	2.520	80.000	12.5 (1340)	0.028 (3)	0.009 (1)	0.522 (56)	11.94 (1280)	0.55	-	-	0.7	-	-				GTF(1600*1280)80Hz
22	114.240	252.242	8.754 (2208)	0.698 (176)	0.507 (128)	1.205 (304)	6.343 (1600)	72.46	2.410	85.000	11.765 (1344)	0.026 (3)	0.009 (1)	0.525 (60)	11.204 (1280)	0.551	-	-	0.7	-	-				GTF(1600*1280)85Hz
23	105.675	261.229	9.463 (2472)	0.766 (200)	0.521 (136)	1.286 (336)	6.891 (1800)	72.82	2.573	75.000	13.333 (1409)	0.028 (3)	0.009 (1)	0.52 (55)	12.775 (1350)	0.548	-	-	0.7	-	-				GTF(1800*1350)75Hz
24	113.040	279.435	8.846 (2472)	0.716 (200)	0.487 (136)	1.202 (336)	6.442 (1800)	72.82	2.405	80.000	12.5 (1413)	0.027 (3)	0.009 (1)	0.522 (59)	11.943 (1350)	0.549	-	-	0.7	-	-				GTF(1800*1350)80Hz
25	120.455	299.667	8.303 (2488)	0.667 (200)	0.481 (144)	1.148 (344)	6.007 (1800)	72.35	2.296	85.000	11.765 (1417)	0.025 (3)	0.008 (1)	0.523 (63)	11.208 (1350)	0.548	-	-	0.7	-	-				GTF(1800*1350)85Hz
26	112.725	278.656	8.871 (2472)	0.718 (200)	0.488 (136)	1.206 (336)	6.460 (1800)	72.82	2.412	75.000	13.333 (1503)	0.027 (3)	0.009 (1)	0.523 (63)	12.774 (1440)	0.55	-	-	0.7	-	-				GTF(1800*1440)75Hz
27	120.560	299.953	8.295 (2488)	0.667 (200)	0.480 (144)	1.147 (344)	6.001 (1800)	72.34	2.294	80.000	2.5 (1507)	0.025 (3)	0.008 (1)	0.523 (63)	11.944 (1440)	0.548	-	-	0.7	-	-				GTF(1800*1440)80Hz
28	80.530	105.656	12.418 (1312)	1.060 (112)	0.303 (32)	1.363 (144)	9.692 (1024)	78.05	2.726	100.000	10.0 (805)	0.037 (3)	0.012 (1)	0.410 (33)	9.537 (768)	0.463	-	-	0.7	-	-				ELSA(1024*768)100Hz
29	137.020	388.041	7.298 (2832)	0.577 (224)	0.433 (168)	1.010 (392)	5.278 (2048)	72.18	2.020	85.000	11.765 (1612)	0.022 (3)	0.007 (1)	0.525 (72)	11.210 (1536)	0.555	-	-	0.7	-	-				GTF(2048*1536)85Hz

Mark ○: Factory adjustment. The number after the mark is the preset number.
Mark □: Factory adjustment [Though they are presets, it does not apply to the specification of the picture distortion. The sync. signals are reference to the above. (It is possible to reset with the above timings.))
Mark ▲: Initial data [So long as initial data, the sync. signals are reference to Hs: + and Vs: -. However, it is necessary to adjust only the NARROW/WIDE, LEFT/RIGHT, DBF-H-AMP and DBF-H-PHASE in factory mode.
The numbers after the marks are the number of preset.

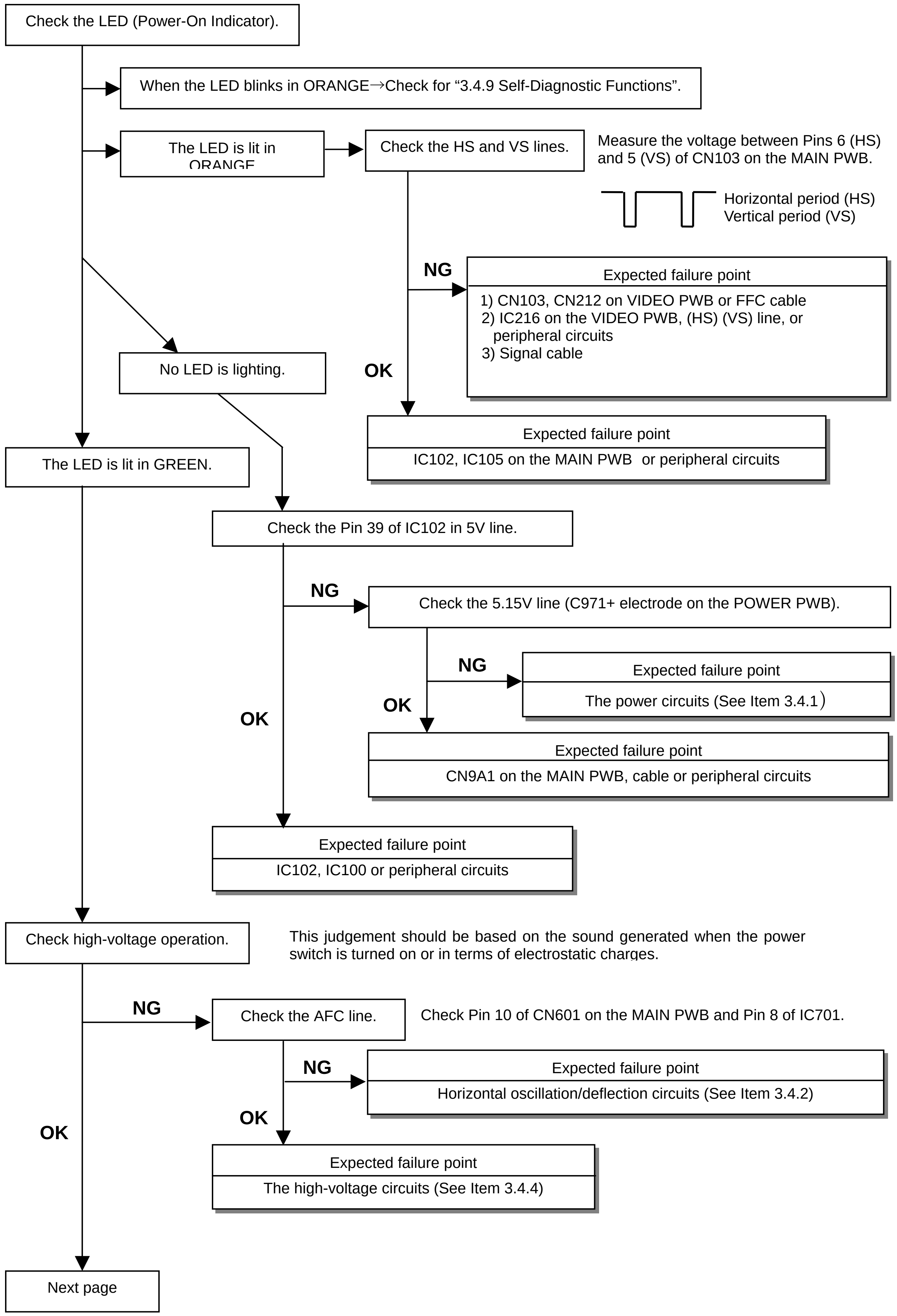
3. TROUBLE SHOOTING

This chapter for troubleshooting is useful if any normal conditions cannot be secured even after the confirmation of “Troubleshooting” presented in the User’s Manual and the completion of “Chapter 2. Adjustment procedures” presented in this Service Manual.

The equipment units related to the possible cause of “Picture bounces or a wavy patterns is present in the picture “ described in “Troubleshooting” presented in the User’s Manual include the electrical equipment such as portable telephones, etc., which may generate electromagnetic waves. Therefore, troubleshooting actions should be taken after turning off the portable telephones, etc., and such electrical equipment that may generate electromagnetic waves, or in a place distant from such equipment.

Contents

3.1 No Raster Generated



CONTINUE

OK

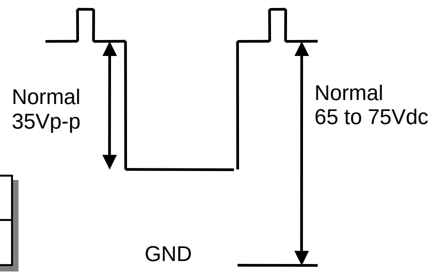
Is the high voltage maintained at approx. 27kV?

NG → Expected failure point
1) IC701, Q701 or peripheral circuit
2) T701 (FBT), C726, R720, or peripheral circuit

OK

Check the R/G/B video output.

Measure the R/G/B video output at Pins R, G and B of CRT socket.



NG → Expected failure point
Video circuit is (See Item 3.4.5)

OK

Check the heater voltage.

Measure the (heater) voltage at Pin 7 of CN202 on the CRT PWB.

NG → Expected failure point
CN202, CRT socket, the CRT or peripheral circuit is

OK

Check the screen voltage.

Measure the voltage of CN201 on the CRT PWB.
Usually, the screen voltage is 600 to 800.

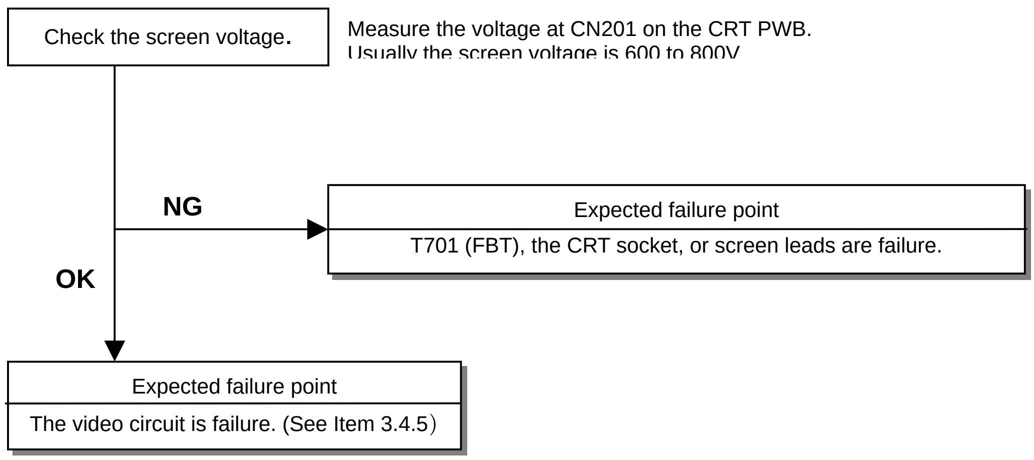
NG → Expected failure point
T701 (FBT), CRT socket or screen lead

OK

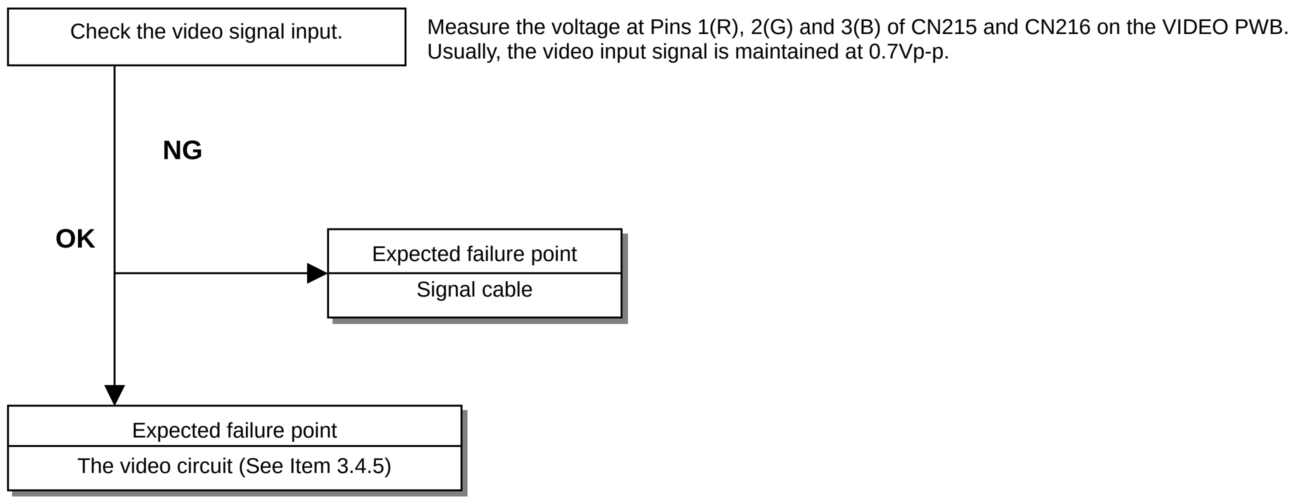
Expected failure point
CRT socket or the CRT

3.2 Abnormal Picture

3.2.1 Raster Brightness Failure

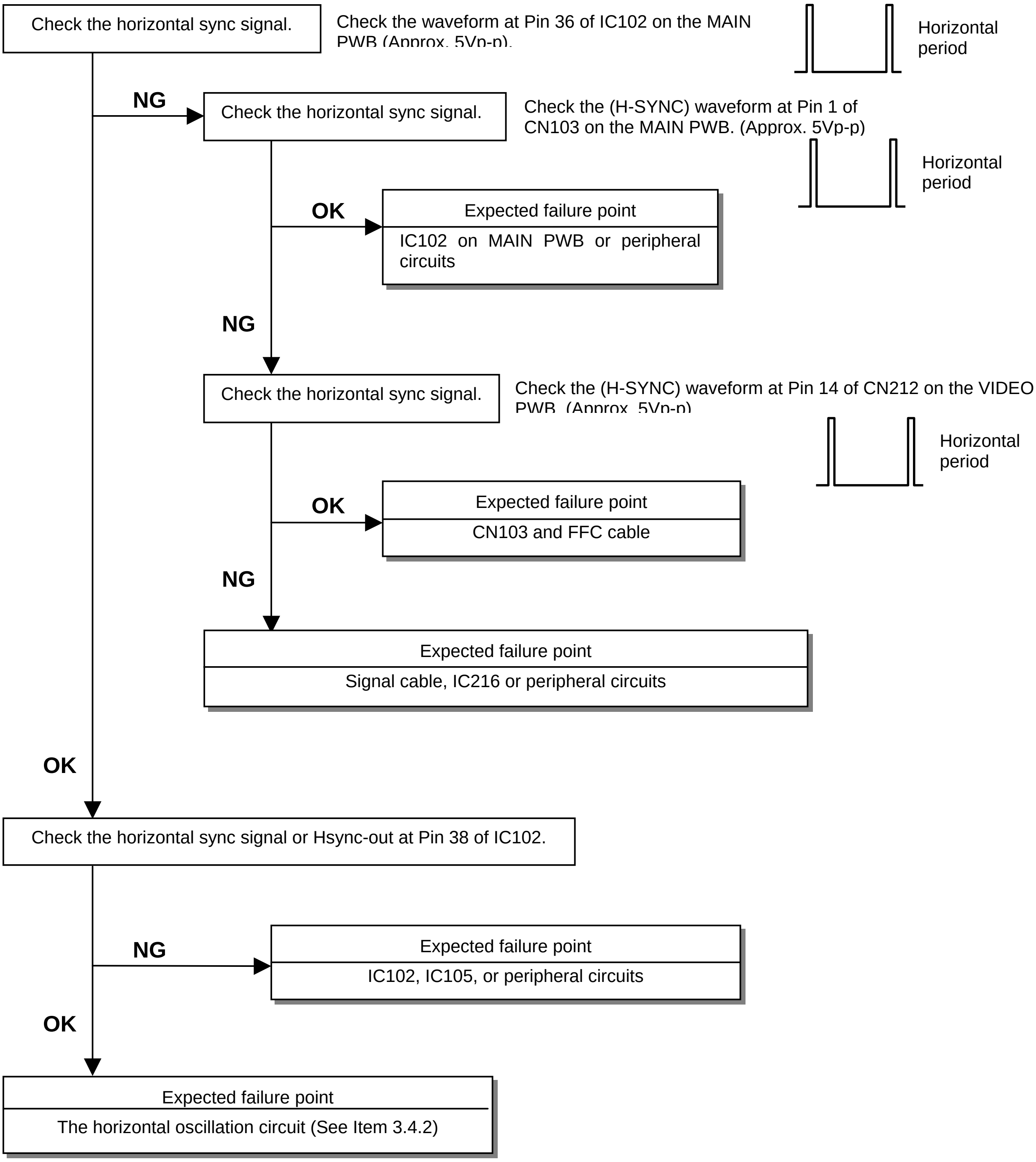


3.2.2. Image Color Failure or Contrast Failure



3.2.3 Sync Failure

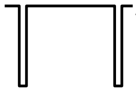
3.2.3.1 Horizontal Sync Unstable



3.2.3.2 Vertical Sync Unstable

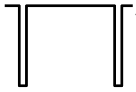
Check the vertical sync signal. — Check the (V-SYNC) waveform at Pin 33 of IC102 on the MAIN PWB. (Approx. 5Vp-p)

- **NG** → **Check the vertical sync signal.** — Check the (V-SYNC) waveform at Pin 5 of CN103 on the MAIN PWB (Approx. 5Vp-p).

  Vertical period

  - **OK** → Expected failure point: IC102 on MAIN PWB or peripheral circuits
  - **NG** → **Check the vertical sync signal.** — Check the (V-SYNC) waveform at Pin 15 of CN212 on the VIDEO PWB. (Approx. 5Vp-p)

    Vertical period

    - **OK** → Expected failure point: CN103 or FFC cable
    - **NG** → Expected failure point: Signal cable, IC216, or peripheral circuits

- **OK** → **Check the vertical sync. or Vsync-out at Pin 32 of IC102.**
  - **NG** → Expected failure point: Signal cable, IC102, IC105 or peripheral circuits
  - **OK** → Expected failure point: The vertical oscillation circuit is failure. (See Item 3.4.3)

3.2.4 Screen Size and Screen Position Failure

3.2.4.1 Horizontal Size Failure

Check the voltage at Pin 9 of IC5C0.

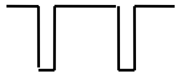
Examine the duty factor of the voltage waveform observed at Pin 9 of IC5C0 on the MAIN PWB and confirm whether it is changed by the adjustment of horizontal size.

NG → Expected failure point: IC5C0 on the MAIN PWB or peripheral circuits

OK ↓

Check the waveform at the gate of Q5F1.

Measure the waveform at the gate of Q5F1 on the MAIN PWB. (Approx. 10Vp-p)



Horizontal period

NG → Expected failure point: Q5F0, Q5F1, Q550 on the MAIN PWB or peripheral circuits

OK ↓

Expected failure point: T550 or the horizontal deflection circuit (See Item 3.4.2)

3.2.4.2 Horizontal Position Failure

(1)Video

Check the H_POSI line.

Confirm that the phase of the voltage waveform at Pin 11 of CN601 on the MAIN PWB changes when the horizontal position is adjusted with OSM.

- **OK** → Expected failure point: Q501, Q502, Q503 on the MAIN PWB peripheral circuits
- **NG** → Expected failure point: IC601 on the DEFL-SUB PWB or peripheral circuits

(2) Horizontal raster centering (VR5A1) failure

Check the power source voltage for centering.

Check voltage between C5A1 and C5A2 on the MAIN PWB. Usually, this voltage is maintained at 5±1V.

- **OK** → Expected failure point: L5A1, VR5A1, Q5A1, Q5A2 on the MAIN PWB, or peripheral circuits
- **NG** → Expected failure point: T550, D5A1 or D5A2

3.2.4.3 Vertical Size and Position Failure

Check the +15 and -15V lines.

Measure voltage at Pin 1 (-15V) and Pin 6 (+15V) of IC401 on the MAIN PWB.

- **NG** → Expected failure point:
  1) IC401
  2) The power circuit, D964 or D965 on the power circuit block
- **OK** ↓

Check the voltage at Pin 15 of CN600.
Check the voltage at Pin 16 of CN600.

Confirm that the voltage amplitude changes within the range of approx. 2.0 to 3.0 Vp-p at Pin 15 of CN600 on the MAIN PWB when the vertical size is control with OSM.

Confirm that the voltage amplitude changes within the range of approx. 3.3 to 3.7V at Pin 16 of CN600 on the MAIN PWB when the vertical position control with OSM.

- **OK** → Expected failure point: IC401 on the MAIN PWB or peripheral circuits
- **NG** → Expected failure point: IC601 on the DEFL-SUB PWB, or peripheral circuits

3.2.5 Linearity Failure

3.2.5.1 Horizontal Linearity Failure

Check the horizontal frequency band selector.

Check voltage at Pins 57-64 of IC102 on the MAIN PWB.

Preset No.	Fh [kHz]	CS8 Pin 64 Q562	CS7 Pin 63 Q561	CS6 Pin 62 Q566	CS5 Pin 61 Q565	CS4 Pin 60 Q568	CS3 Pin 59 Q567	CS2 Pin 58 Q563	CS1 Pin 57 Q564
1	31.5	H	L	L	L	L	L	L	L
2	46	L	L	L	H	L	H	L	H
3	60	L	H	L	L	H	L	H	H
4	69	H	L	H	L	L	H	H	H
5	80	L	L	H	H	L	H	H	H
6	91	H	L	H	L	H	H	H	H
7	93	L	H	H	L	H	H	H	H
8	106	H	L	L	H	H	H	H	H
9	112	L	L	H	H	H	H	H	H

CS switching FET Q561 to Q568 are H: Off, L: ON

NG

Expected failure point

IC102 on the MAIN PWB or peripheral circuits

OK

Expected failure point

- Relation of Character S capacitor changeover
  Q561- Q568, C564- C568, C576-C578 or C580 on the MAIN PWB or peripheral circuits

- Relation of linearity coil control
  Q560, L561, IC101 or peripheral circuits

3.2.5.2 Vertical Linearity Failure

Check Pin 15 of CN600.

Check how the voltage waveform at Pin 15 of CN600 on the MAIN PWB changes to the shape of Character C when up and down balance control is carried out for OSM linearity.

Check how the voltage waveform at Pin 15 of CN600 on the MAIN PWB changes to the shape of Character S when vertical balance control is carried out for OSM linearity.

NG → Expected failure point: IC601 on the DEFL-SUB or peripheral circuits

OK ↓

Check Pins 3 and 8 of CN601.

Check voltage between SW-VLIN1 and SW-VLIN2.

Fv [Hz]	V-Lin-SW1	V-Lin-SW2
50 -	L	L
73 -	H	L
90 -	L	H
125 -	H	H

NG → Expected failure point: IC102 on the MAIN PWB or peripheral circuits

OK ↓

Expected failure point: IC401 on the MAIN PWB, IC601, Q603, Q604, IC603 on the DEFL-SUB PWB or peripheral circuits

3.2.6 Distortion Compensation Circuit Failure

3.2.6.1 IN/OUT (pincushion), ALIGN (trapezoidal) and TOP/BOTTOM (corner correction) Failure

Check the voltage at Pin 12 of CN600.

Check the output waveform at Pin 12 of CN600 on the MAIN PWB.
Confirm that the waveform changes to parabola form when IN/OUT is selected by the OSM.
Confirm that the waveform changes to saw-tooth form when ALIGN is selected by the OSM.

- **NG** → Expected failure point: IC601 on the DEFL_SUB PWB or peripheral circuits
- **OK** ↓

Check the waveform at Pin 9 of IC5C0.

Check the output waveform at Pin 9 of IC5C0 on the MAIN PWB.

- **NG** → Expected failure point: IC5C0 on the MAIN PWB or peripheral circuits
- **OK** ↓

Check the waveform at the gate of Q5F1.

Examine the duty factor of the voltage waveform observed at the gate of Q5F1 on the MAIN PWB and confirm whether it is changed by the adjustment of OSM.

- **NG** → Expected failure point: Q5F0, Q5F1, Q550 on the MAIN PWB or peripheral circuits
- **OK** ↓

Expected failure point: T550 on the MAIN PWB or peripheral circuits for deflection output

3.2.6.2 LEFT/RIGHT (pincushion balance), TILT (parallelogram), and TOP BALANCE/BOTTOM BALANCE (corner correction) Failure

Check the voltage at Pin 11 of CN601.

Examine the voltage waveform observed at Pin 11 of CN601 on the MAIN PWB and confirm whether its phase is changed by the adjustment of OSM.

- **NG** → Expected failure point: IC601 on the DEFL-SUB PWB or peripheral circuits
- **OK** ↓

Expected failure point: Q501, Q502, Q503, Q504 and T501 on the MAIN PWB, or peripheral circuits

3.2.6.3 ROTATE (raster rotation) Failure

Check voltage at Pin 45 of IC102 of the MAIN PWB.

Control the ROTATE with OSM and confirm whether it changes within the range of 0 to 5V DC at Pin 45 of IC102.

- **NG** → Expected failure point: IC102 or peripheral circuits
- **OK** ↓

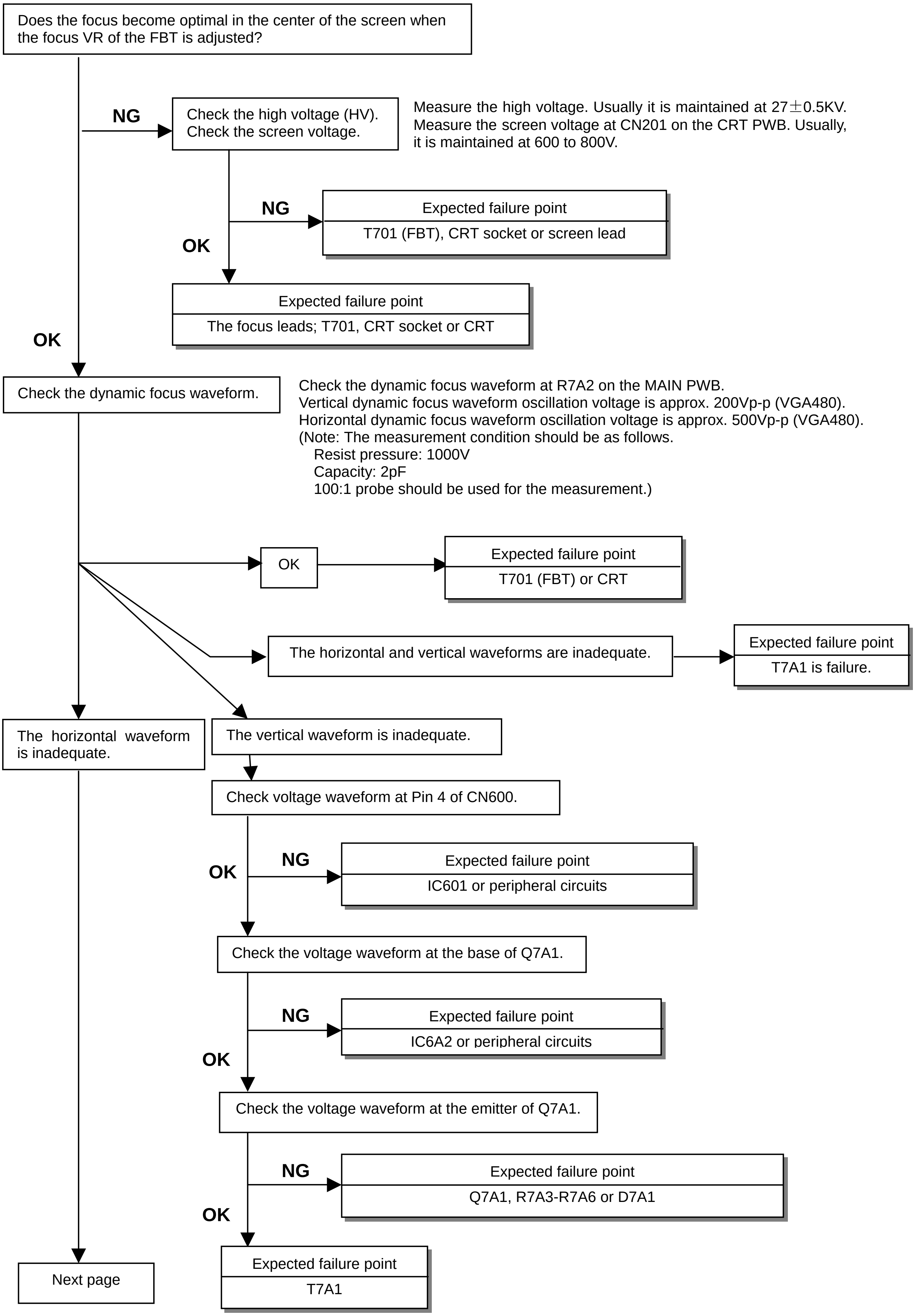
Check voltage at Pin 1 of IC804.

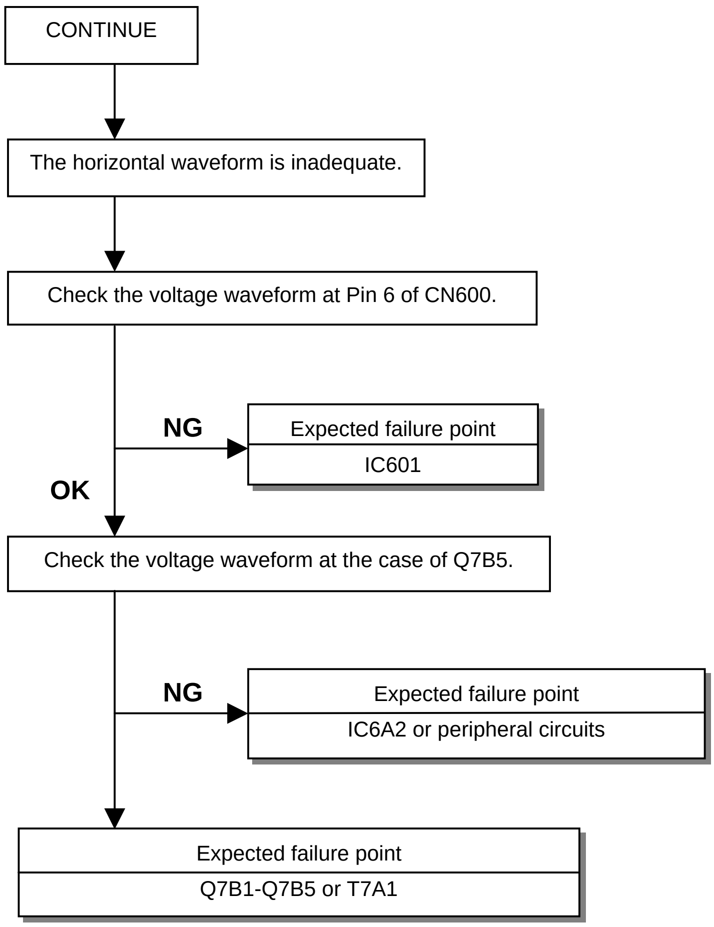
Control the ROTATE with OSM and confirm whether it changes within the range of 0 to 15V DC at Pin 1 of IC804.

- **NG** → Expected failure point: IC804 or peripheral circuits
- **OK** ↓

Expected failure point: CN802 or rotation coil

3.2.7 Focus Failure

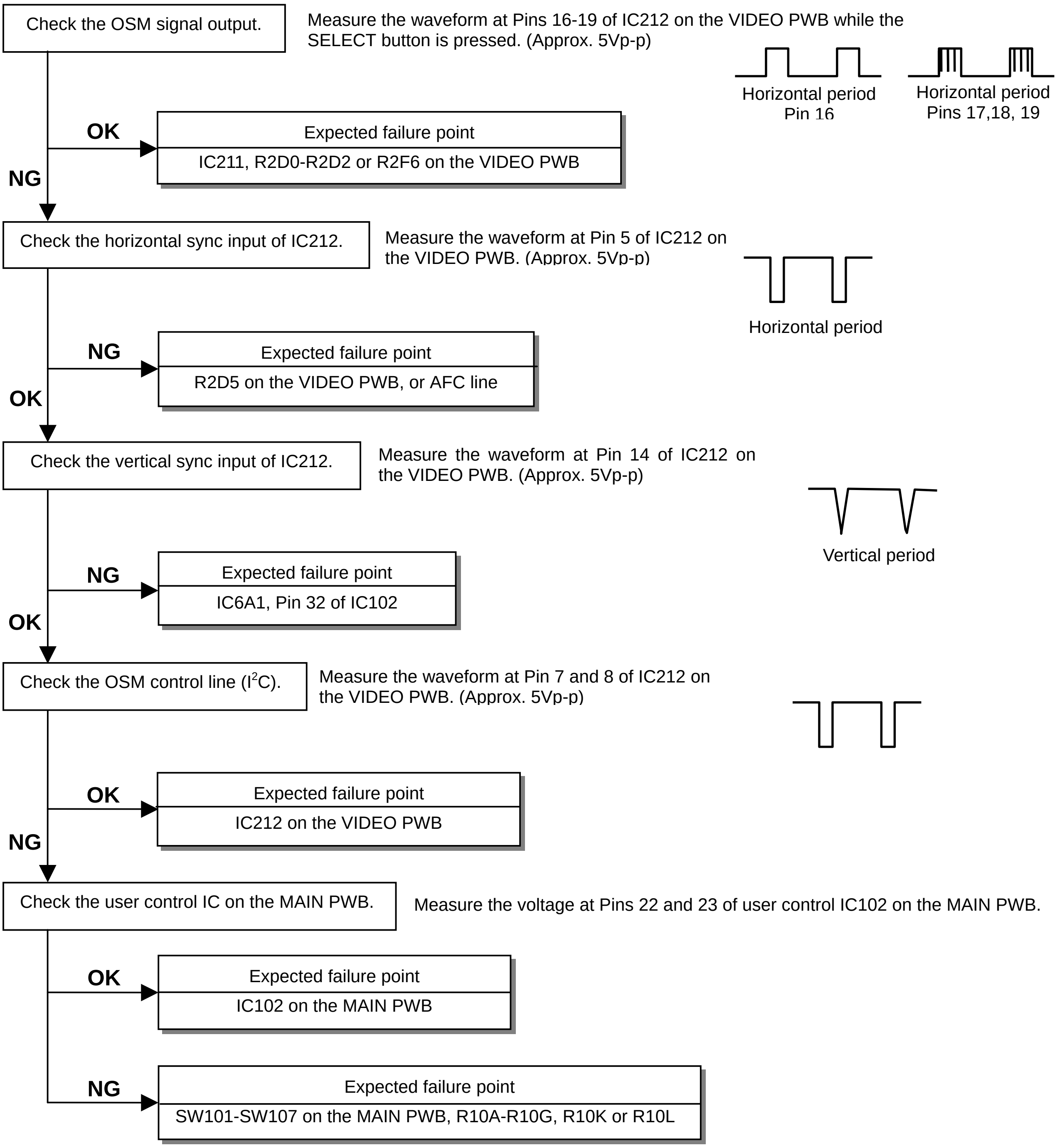



CONTINUE
The horizontal waveform is inadequate.
Check the voltage waveform at Pin 6 of CN600.
NG
Expected failure point
IC601
OK
Check the voltage waveform at the case of Q7B5.
NG
Expected failure point
IC6A2 or peripheral circuits
Expected failure point
Q7B1-Q7B5 or T7A1

3.3 Functional Errors

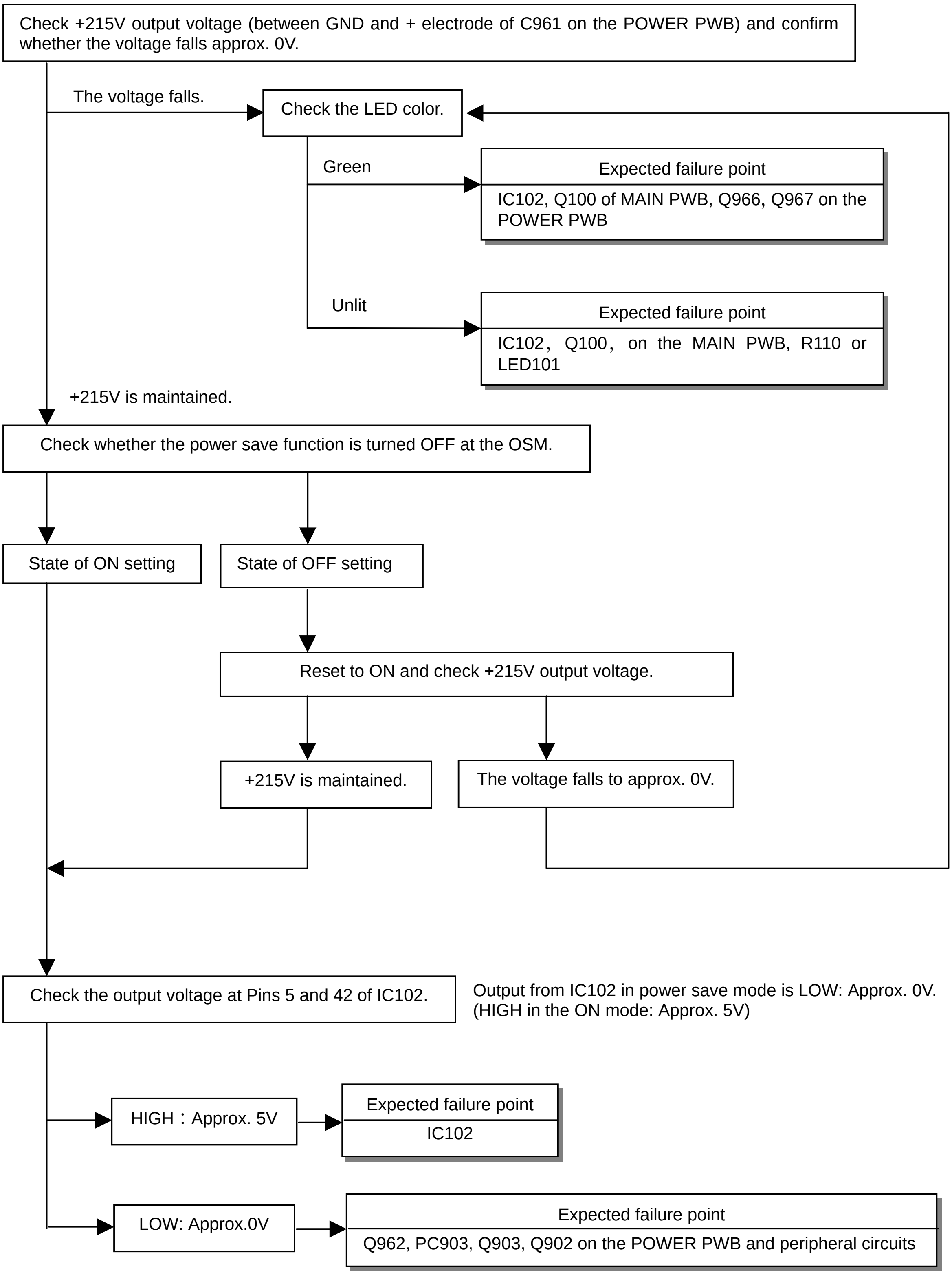
3.3.1 OSM Failure

Note: See “3.2 Abnormal picture” if a screen is not available even though a video signal input is entered.

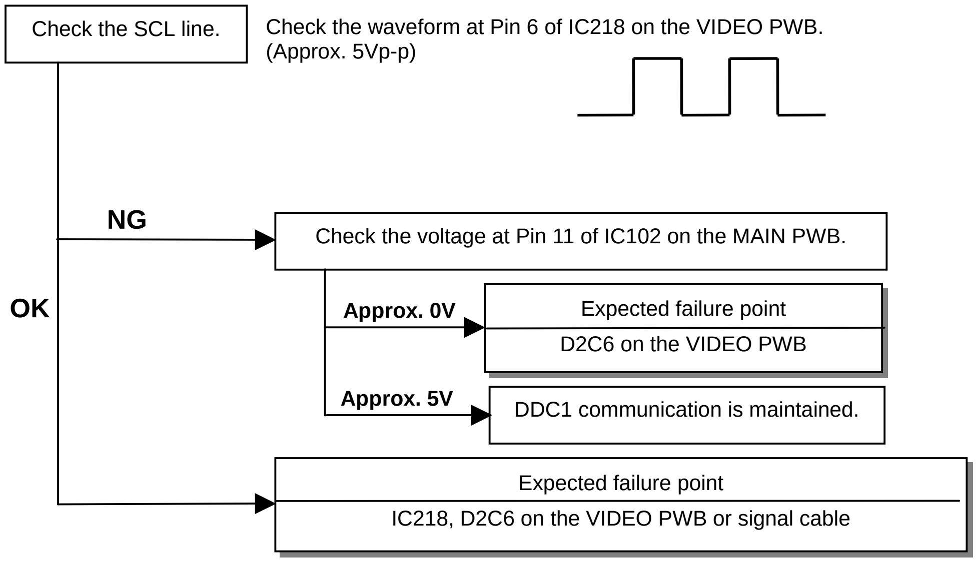


3.3.2 Power Management Functional Operation Error

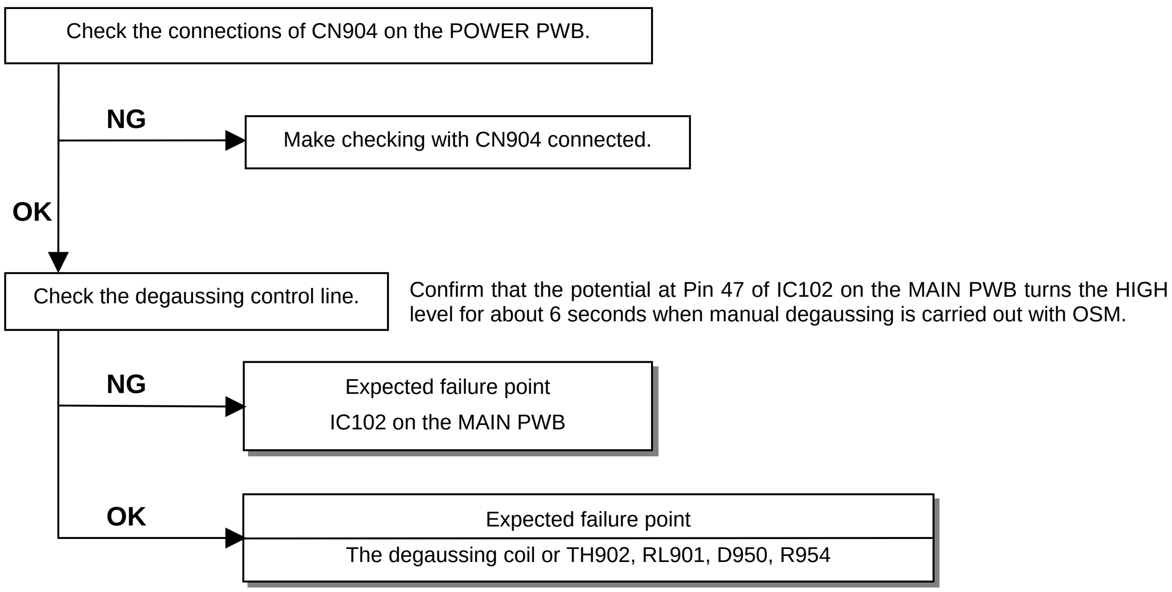
First of all, disconnect the signal cables from the signal source.
(If a signal input is removed, the high voltage (HV) falles and the LED turns to ORANGE.)



3.3.3 Plug & Play (DDC2B) Operation Error



3.3.4 Degaussing Functional Operation Error



3.3.5 Key Operation Error

Check voltages with operation keys.

Confirm that the voltage at Pin 22 and 23 of IC102 on the MAIN PWB are as specified in the table below when the operation key is pressed.

Voltage at Pins 22 and 23 of IC102 during key operation

Pin No./Terminal name	Pin 23/KEY1	Pin 22/KEY2
EXIT (SW101) ON	5V	3.65V
◀ (SW102) ON	3.65V	5V
▶ (SW103) ON	5V	1.6V
- (SW104) ON	5V	2.38V
+ (SW105) ON	1.69V	5V
SEL (SW106) ON	5V	0V
RESET (SW107) ON	0V	5V

NG →

Expected failure point

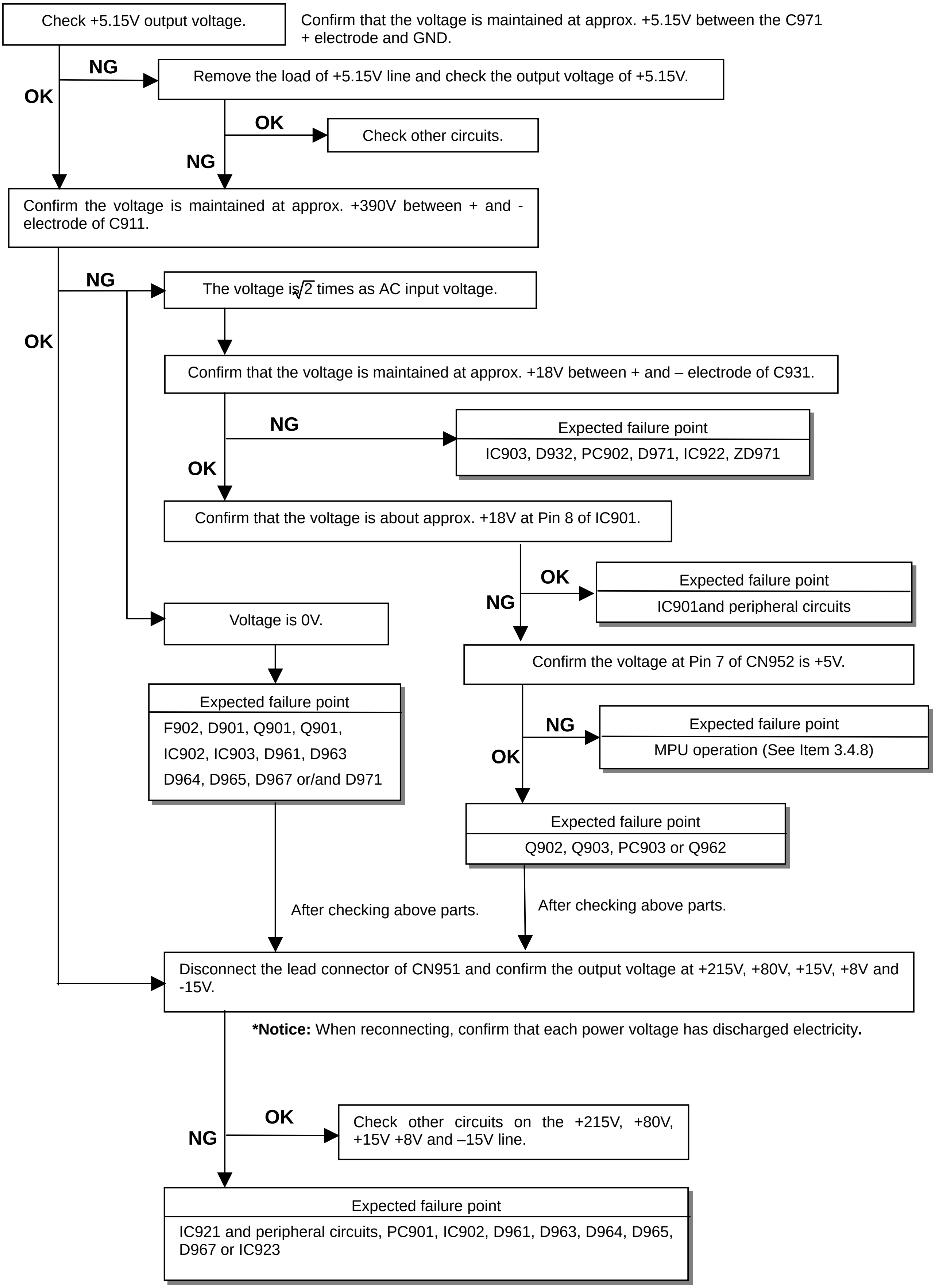
SW101-SW107, R10A-R10G, R10K, R10L or peripheral circuits

OK ↓

MPU operation error (See Item 3.4.8)

3.4. Circuit Errors

3.4.1 Power Circuit Failure



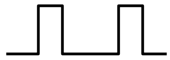
3.4.2 Horizontal Oscillation /Deflection Circuit Failure

(Check “3.1 No Raster Generated” and “3.2.3.1 Horizontal Sync Unstable” before this item)

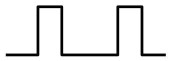
Check the 215V line. — Check the voltage at Pin 1 of CN9A0 on the MAIN PWB.

- **NG** → Check the 215V line again after jumper in Pin 1 of CN9A0 line has been removed.
  - ***Notice:** When reconnecting CN9A0, confirm that Pin 1 has discharged electricity.
  - **OK** → Expected failure point: Q5F0, Q5F1, IC5C0 on the MAIN PWB or peripheral circuits
  - **NG** → Expected failure point: Switching power circuit (See Item3.4.1)
- **OK** ↓

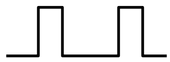
Check horizontal drive pulse. — Measure the drive pulse voltage at the gate of Q504 on the MAIN PWB, and confirm that there is a rectangular output of 10Vp-p.



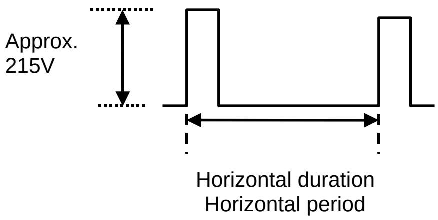
- **OK** → **Check the drive pulse.** — Measure the drain voltage at Q504 on the MAIN PWB, and confirm that there is a rectangular output of 40 Vp-p.



  - **NG** → Expected failure point: Q504, D501 on MAIN PWB or peripheral circuit
  - **OK** ↓ **Check the waveform at the base of Q550.** — Measure the voltage waveform at the base of Q550 on the MAIN PWB, and confirm that there is a rectangular output of about 10Vp-p.



  - **NG** → Expected failure point: Q550, T501, D502, D550 on the MAIN PWB or peripheral circuits
  - **OK** ↓ **Check the drain waveform at Q5F1.** — Check the drain voltage waveform of Q5F1 on the MAIN PWB, and confirm that there is a waveform output as shown below.



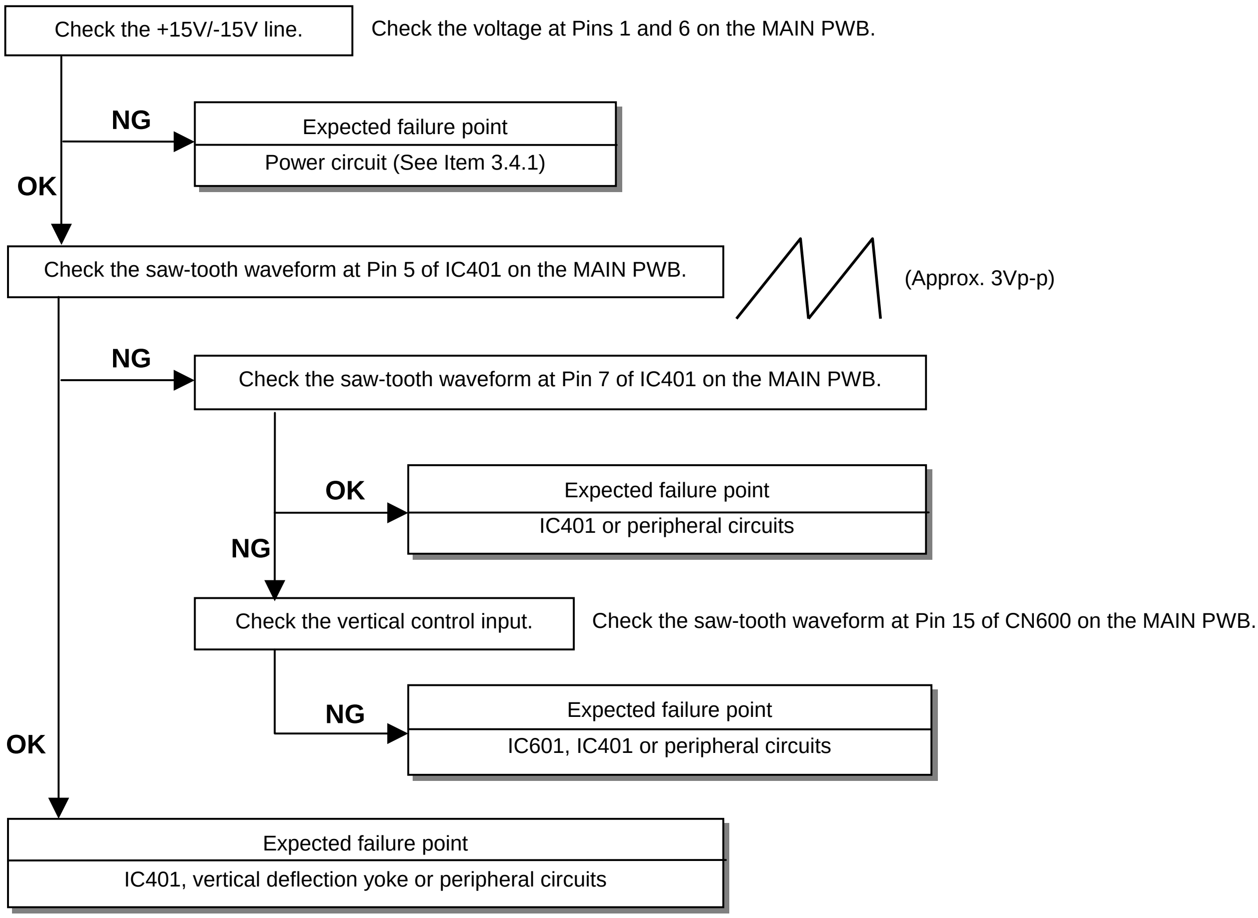
  - **NG** → Expected failure point: Q5F0, Q5F1, IC5C0 on the MAIN PWB or peripheral circuits
- **NG** ↓

Check the range of horizontal oscillation. — Confirm that the voltage waveform of Pin 11 of CN601 on the MAIN PWB is approx. 1Vp-p.

- **OK** → Expected failure point: Q501, Q502, Q503 on the MAIN PWB or peripheral circuits
- **NG** → Expected failure point: IC601 on the DEFL-SUB PWB or peripheral circuits

3.4.3 Vertical Oscillation / Deflection Circuit Failure

(Check “3.2.3.2 Vertical Sync Unstable” before checking of this item)



3.4.4 High Voltage (HV)Circuit Failure

(Check “3.1 No Raster Generated” before this item)

Check the HV. — Check the anode voltage of CRT. Usually, this high voltage is maintained at about 25kV.

↓

Check the 80V line. — Check the voltage at L701 on the MAIN PWB.

NG → Expected failure point
1) Q701, T701 (FBT) or peripheral circuits
2) Video circuit (See Item 3.4.5)
3) The switching power circuit (See Item 3.4.1)

OK ↓

Check the 12V line. — Check the voltage at Pin 10 of IC701 on the MAIN PWB.

NG → Expected failure point
1) IC701 on the MAIN PWB or 12V line
2) The video circuit (See Item 3.4.5)

OK ↓

Check the AFC pulses. — Check the voltage at Pin 8 of IC701 on the MAIN PWB.

NG → Expected failure point
The horizontal oscillation/ deflection circuits (See Item3.4.2)

OK ↓

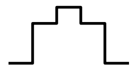
Check the HV drive pulses. — Check the voltage waveform at the emitter Q702 on the MAIN PWB.

NG → Expected failure point
Q701, IC701, T701 (FBT) on the MAIN PWB or peripheral circuit

3.4.5 Video Circuit Failure

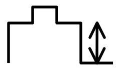
(Check "3.2.2 Image Color Failure or Contrast Failure" before this item)

Check the R, G, B video outputs. — Measure the waveforms at R200R, R200G, and R200B on the CRT PWB in the full white pattern.



- **OK** → To CONTINUE **1** on the Next page
- **NG** → **Check the 80V line.** — Measure the voltage between GND and Pin 6 of IC210 on the VIDEO PWB.
  - **NG** → Expected failure point:
    1) CN211, IC210 or peripheral circuits
    2) Power circuit (See Item 3.4.1)
  - **OK** ↓

Check the output waveform of output IC. — Measure the waveform at Pins 1, 3 and 5 of IC210 on the VIDEO PWB. (Approx. 35Vp-p)

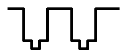


- **OK** → Expected failure point: Anyone of R210R/G/B on the VIDEO PWB, L200R/G/B, R200R/G/B on the CRT PWB or the CRT socket
- **NG** ↓

Check the 12V line — Measure the voltage between GND and Pin 2 of CN211.

- **NG** → Expected failure point: IC211, IC212 or 12V-regulator circuit of the power circuit
- **OK** ↓

Check the input waveform of the output IC. — Measure the waveforms at Pins 8, 9 and 11 of IC210 on the VIDEO PWB. (Approx. 2.5Vp-p)



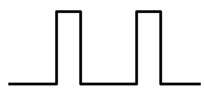
- **OK** → Expected failure point: IC210 on the VIDEO PWB
- **NG** ↓

Check the input waveform of the pre-AMP. — Measure the potential at Pin 1,3 and 6 on the VIDEO PWB. (Approx. 0.7Vp-p)



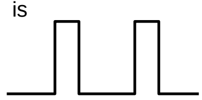
- **NG** → Expected failure point: IC216 on the VIDEO PWB
- **OK** ↓

Check the blanking signal. — Measure the waveform at Pin 14 of IC211 on the VIDEO PWB. Confirm that the blanking waveform is maintained at approx. 5Vp-p.



- **NG** → Expected failure point: IC601 on the DEFL_SUB PWB or CN212
- **OK** ↓

Check the clamp waveform. — Measure the potential at Pin 13 of IC211 on the VIDEO PWB, and confirm that clamp waveform is maintained at approx. 5Vp-p.



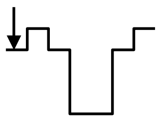
- **NG** → Expected failure point: IC102 on the MAIN PWB, or CN212
- **OK** → To CONTINUE **2** on the Next page

CONTINUE **1**

CONTINUE **2**

- **Check the output waveform of pre-AMP.** — Measure the waveform at R/G/B output Pins 25, 27 and 29 of IC211 on the VIDEO PWB.
  - **NG** → Expected failure point: IC211 on the VIDEO PWB
  - **OK** → Expected failure point: L211R/G/B, R211R/G/B

- **Check the R, G, B video outputs.** — Measure the voltage waveform at R200R/G/B on the CRT PWB, and confirm whether BLACK LEVEL voltage is maintained at approx. 60-90V.



  - **NG** → **Check the 215V line.** — Measure the voltage between GND and + electrode of C260.
    - **NG** → Expected failure point: CN211 or 215V line of power circuit
    - **OK** → **Check the voltage of C210R/G/B on the VIDEO PWB.** — Confirm the voltage is approx. 60-100V.
      - **NG** → **Confirm the voltage at the base of R250R/G/B is approx. 6V.**
        - **NG** → Expected failure point: R261, D264, R260 or peripheral circuits
        - **OK** → Expected failure point: Q250R/G/B or Q251R/G/B
      - **OK** → Expected failure point: L200R/G/B or L201R/G/B
  - **OK** ↓
- **Check the HV operation.** — Confirm whether the HV is 27±0.5KV.
  - **NG** → Expected failure point: The HV circuit (See Item 3.4.4)
  - **OK** ↓
- **Check the heater voltage.** — Measure the voltage at both terminals of C203H on the CRT PWB. Usually, the voltage is approx. 6.3V.
  - **NG** → Expected failure point:
    1) CN211
    2) The switching power circuit (See Item 3.4.1)
  - **OK** ↓
- **Check the screen control of FBT.** — Confirm the voltage of R205S on the CRT PWB is approx. 600-800V.
  - **NG (too low)** → Expected failure point: T701 on the MAIN PWB or CRT socket on the CRT PWB
  - **OK** → Expected failure point: CRT

3.4.6 Static Convergence Compensation Circuit Failure

Adjust the static convergence by OSM control.

- OK → Good
- NG ↓

Confirm that the voltage (DC level) at Pins 3 (H-STA) and 4 (V-STA) of IC8A1 on the MAIN PWB is variable within the range of 0 to 5V by OSM control.

- NG → Expected failure point: IC6A2 or IC6A3
- OK ↓

(H-STA) Confirm that the output voltage at Pin 1 of IC8A1 is variable by OSM control.
(V-STA) Confirm that the output voltage at Pin 6 of IC8A1 is variable by OSM control.

- NG → Expected failure point: IC8A1, R8A2 or R8B7
- OK ↓

Expected failure point

(H-STA) The horizontal static convergence coil of Pins 1 and 2 of CN8A1
(V-STA) The vertical static convergence coil at Pins 3 and 4 of CN8A1

Replace the DY (deflection yoke) if the horizontal or vertical static convergence coil has been found to be failure.

3.4.7 Corner Purity Compensation Circuit Failure

Adjust the corner purity by OSM control.

- **OK** → Good
- **NG** ↓

Confirm that the voltage at Pins 49 (TR), 50 (TL), 51 (BR) and 52 (BL) of IC102 on the MAIN PWB are variable by OSM control.

- **NG** → Expected failure point: IC102
- **OK** ↓

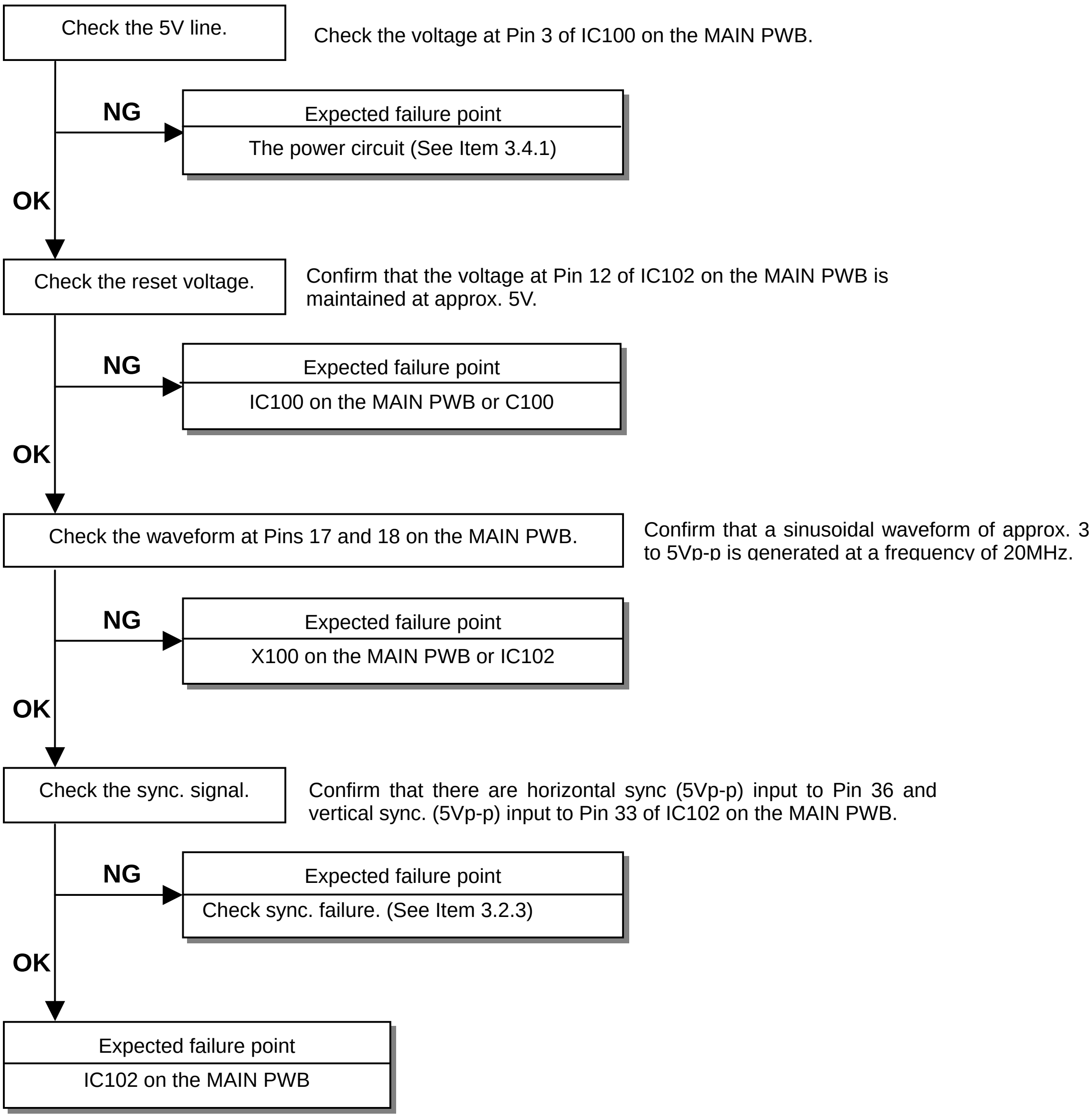
(TR): Confirm that the output voltage at Pin 8 of IC803 is variable by OSM control.
(TL): Confirm that the output voltage at Pin 2 of IC803 is variable by OSM control.
(BR): Confirm that the output voltage at Pin 8 of IC801 is variable by OSM control.
(TL): Confirm that the output voltage at Pin 2 of IC801 is variable by OSM control.

- **NG** → Expected failure point: IC801 or IC803
- **OK** ↓

Expected failure point

1) (TR): The corner purity coil of Pin 2 of CN801
2) (TL): The corner purity coil of Pin 4 of CN801
3) (BR): The corner purity coil of Pin 6 of CN801
4) (BL): The corner purity coil of Pin 8 of CN801

3.4.8 MPU Operation Error



3.4.9 Self-Diagnostic Functions

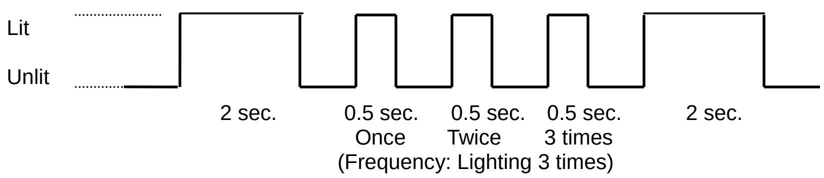
This model is provided with the functions that a circuit error is detected by the MPU and this error is indicated by the LED blink frequency.

When the protector is in operation, the LED is made to blink as shown below in order to indicate the factor of protector operation.

LED Blinking Patterns for Each Protector Operation (List of Protector Indicators)

Protector condition	LED condition	
	Short (0.5s) lighting frequency	Long (2s) lighting frequency
HV data error	3	1
HV latch (fall)	2	1
Beam protector	5	1
Secondary power short	7	
X-lay protector	1	1

(1) How to count the LED lighting frequency [Example: HV data error (3 times)]



(2) Diagnostic mode and error circuit

3 times --- HV data error ------------------------- Power OFF/ON and data recovery
(HV adjustment value is destroyed or IC104 is failure).

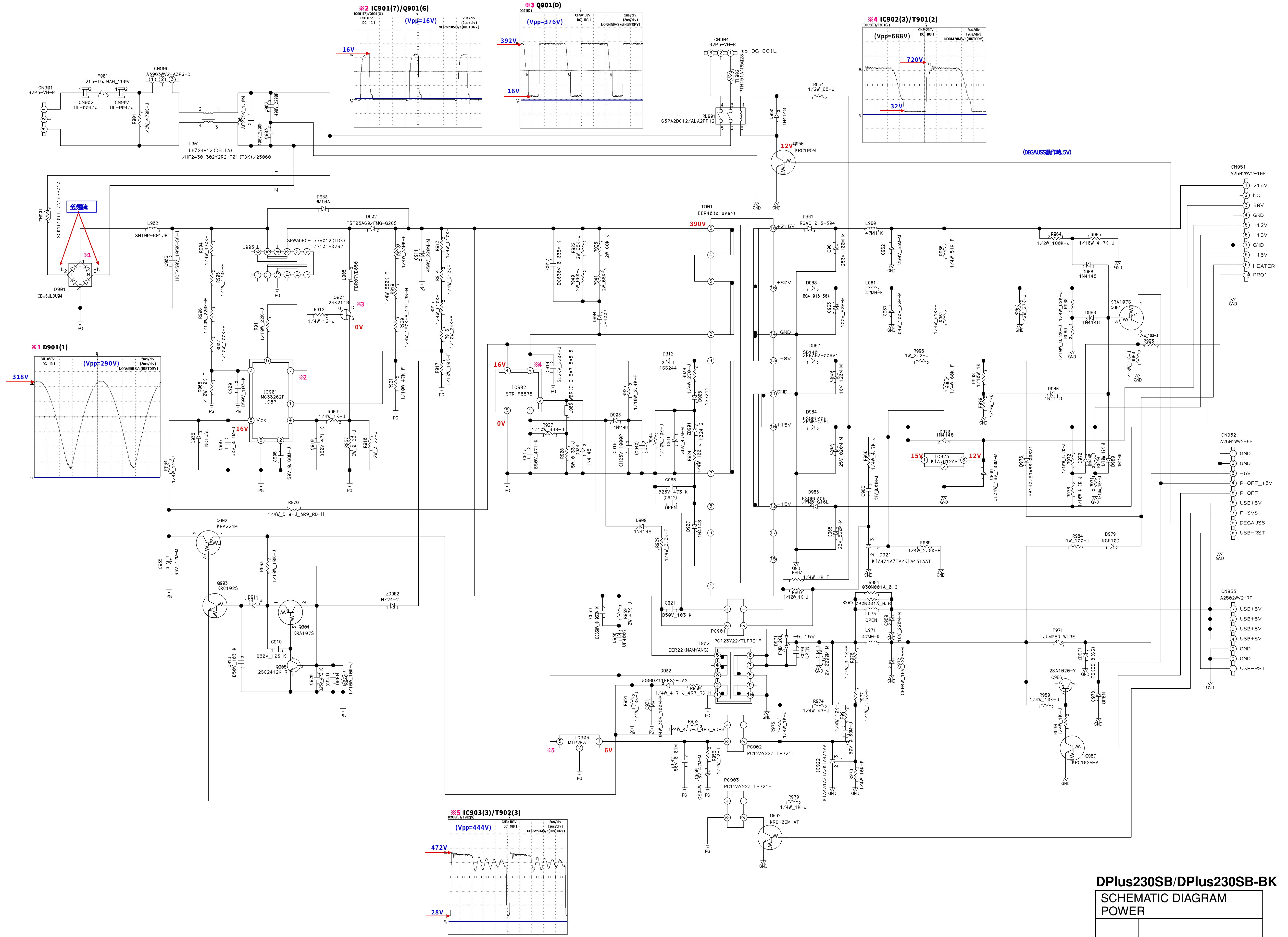
2 times --- HV latch (falls) ----------------------- Check Item 3.4.4

5 times --- Beam protector ---------------------- Check Item 3.4.4

6 times --- Secondary power short ------------ Check Item 3.4.1

4. Wave form

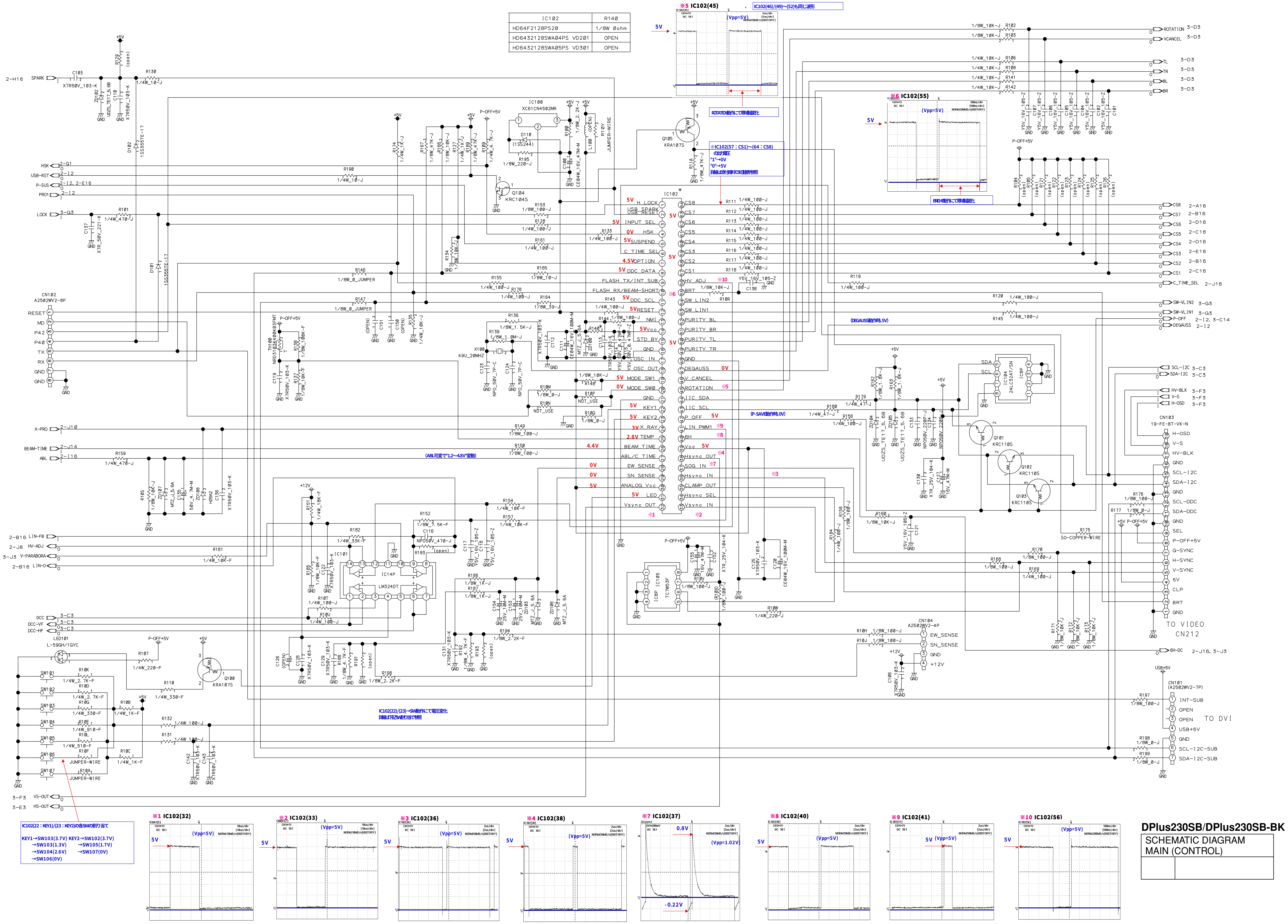
1. POWER
2. CONTROL (MAIN)
3. DEFL (MAIN)
4. DEFL-SUB & COIL-DRIVE (MAIN)
5. VIDEO



DPlus230SB/DPlus230SB-BK

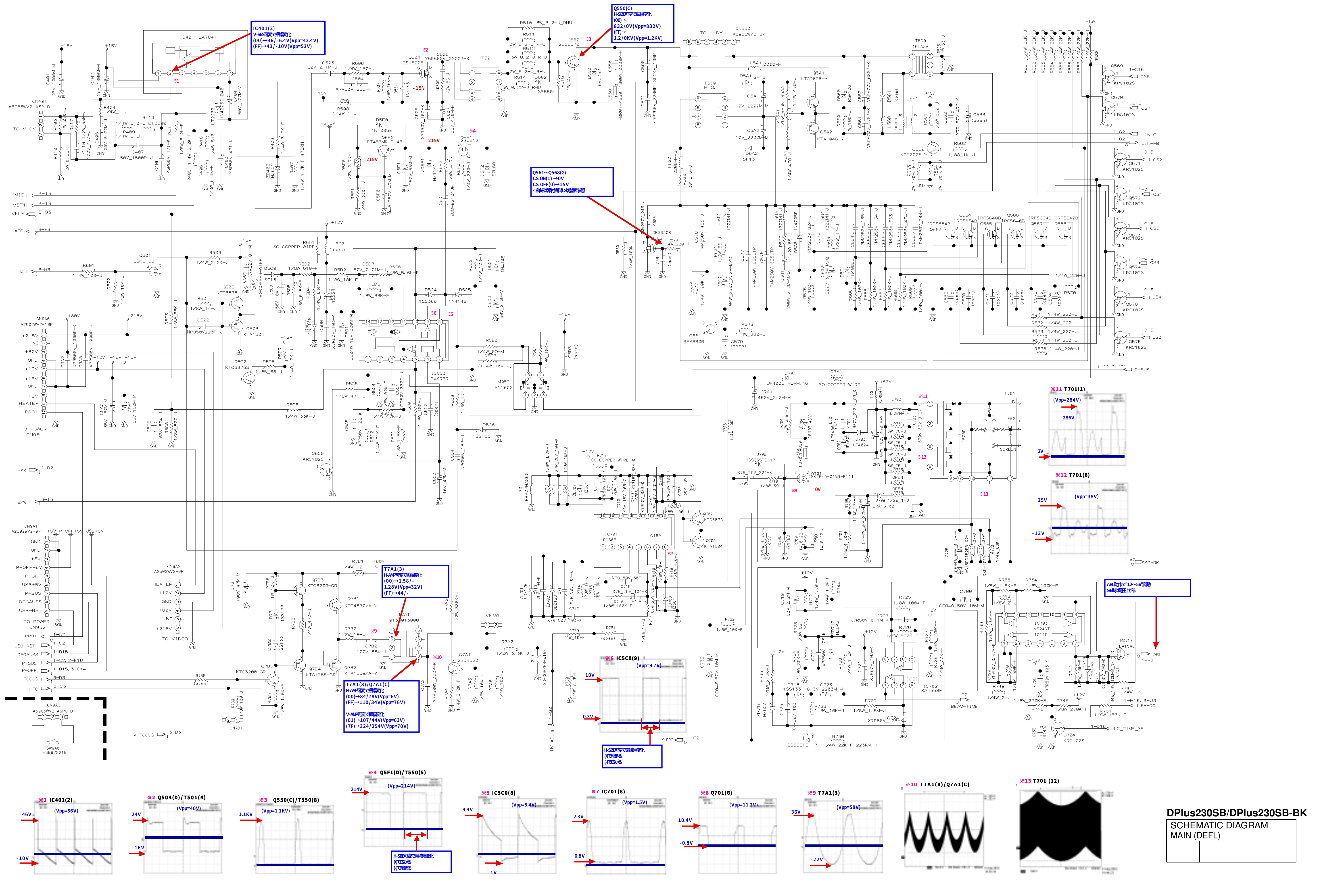
SCHEMATIC DIAGRAM
POWER

IC102	R140
HD64F2128PS20	1/8W 0ohm
HD6432128SWA04PS VD201	OPEN
HD6432128SWA05PS VD301	OPEN



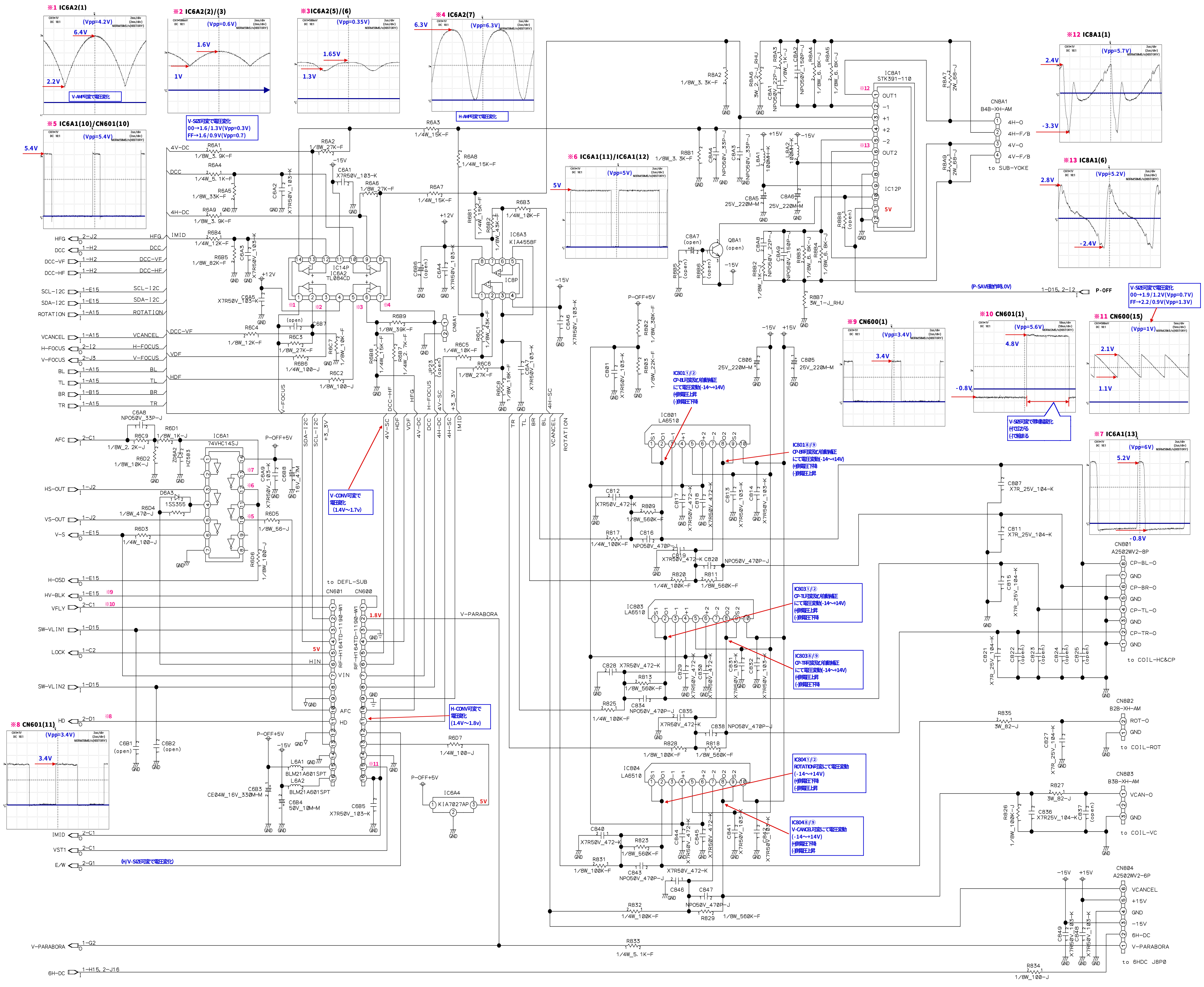
DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM
MAIN (CONTROL)



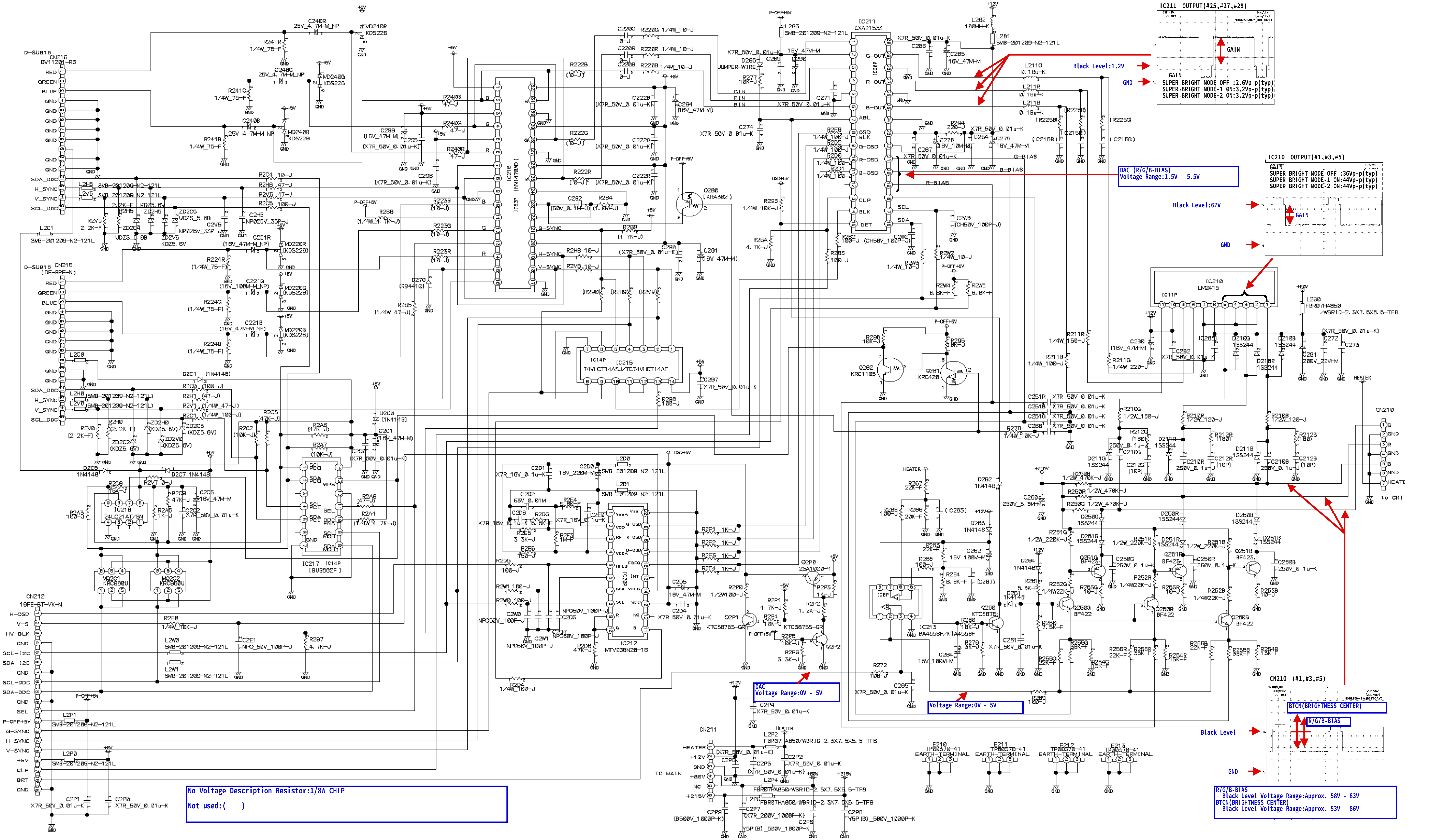
DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM
MAIN (DEFL)



DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM
MAIN (DEFL-SUB&COIL-DRIVE)

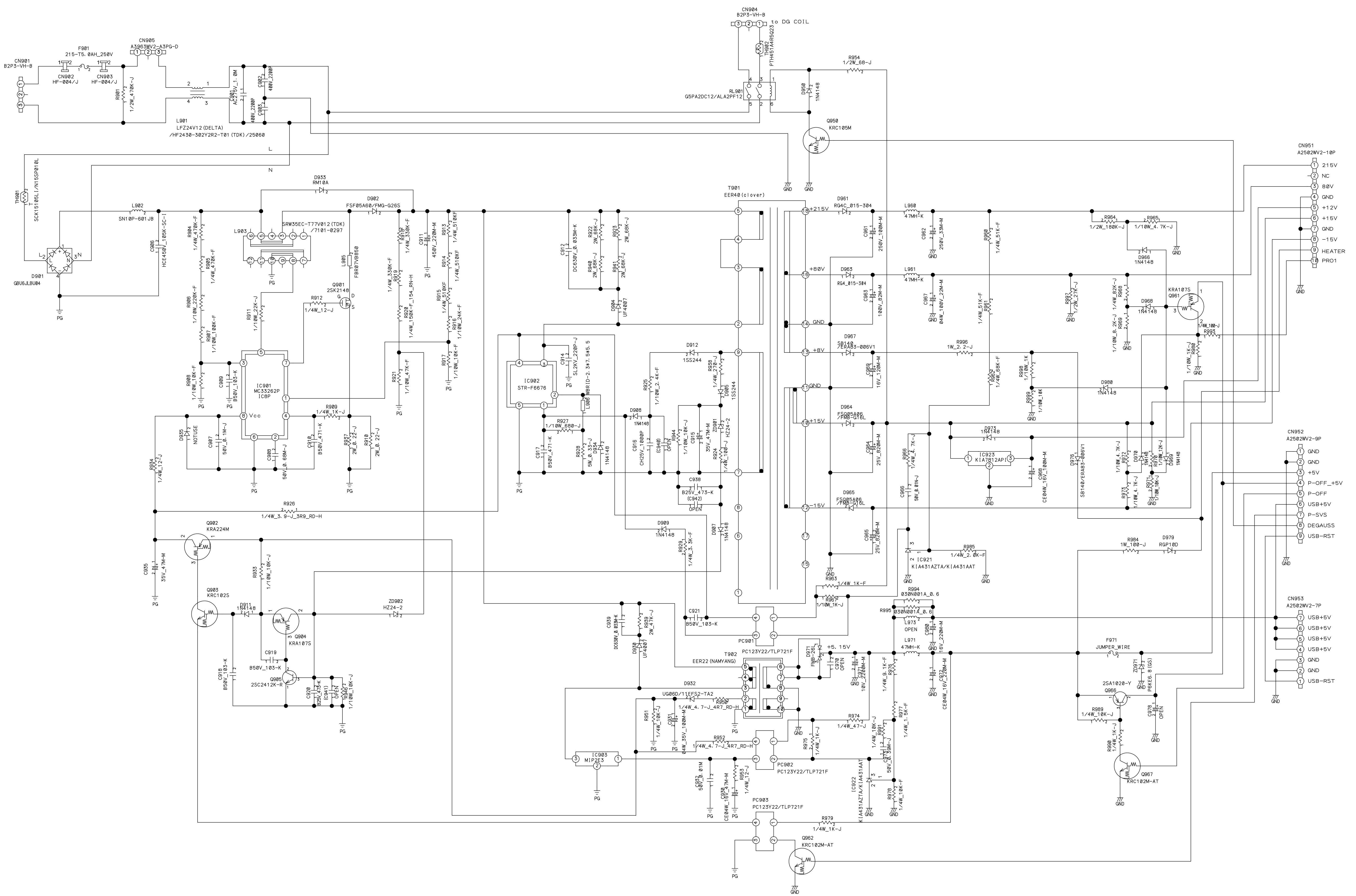


DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM VIDEO	

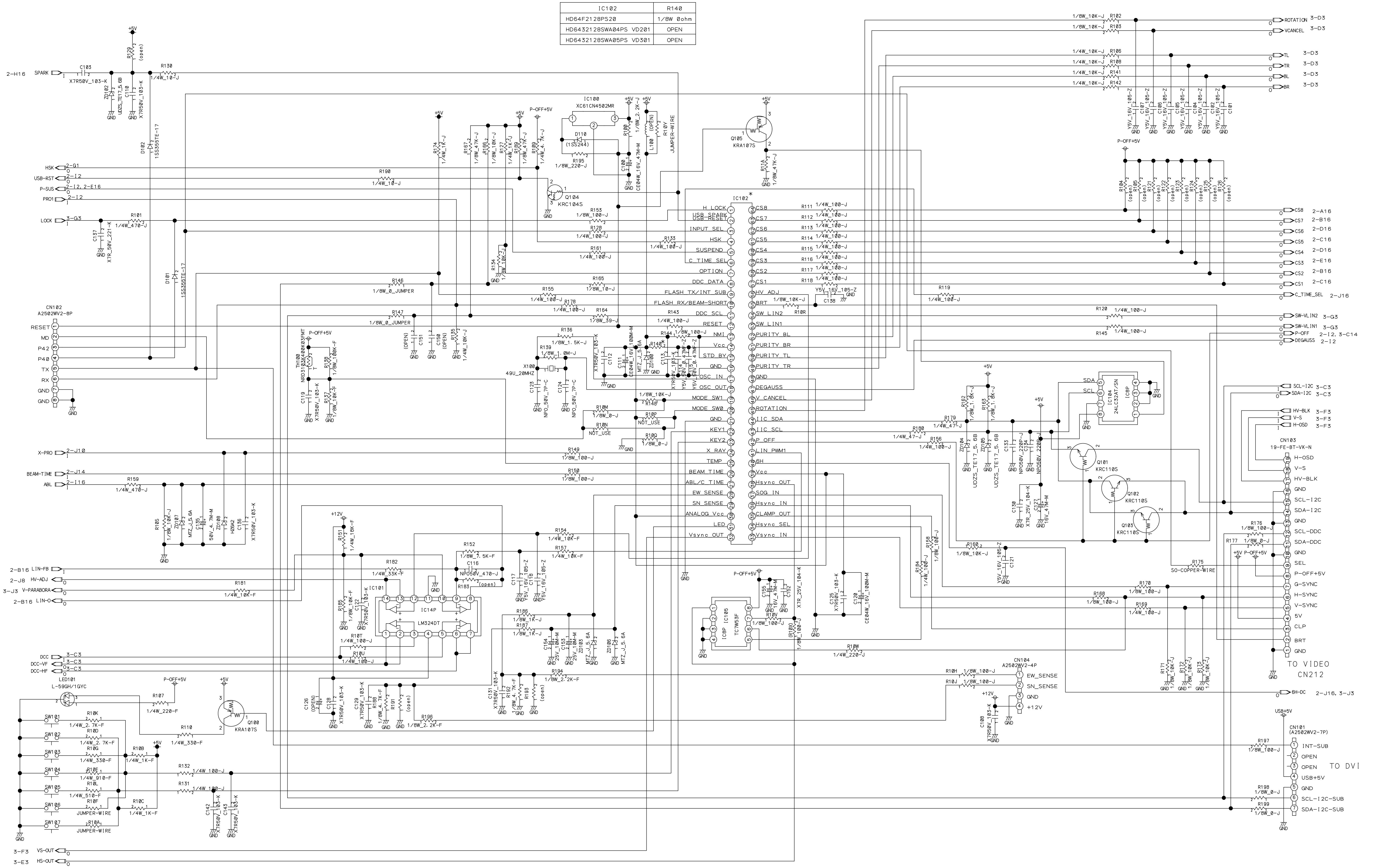
5. Schematic diagram

1. POWER
2. CONTROL (MAIN)
3. DEFL (MAIN)
4. DEFL-SUB & COIL-DRIVE (MAIN)
5. DEFL-SUB
6. VIDEO
7. CRT



DPlus230SB/DPlus230SB-BK

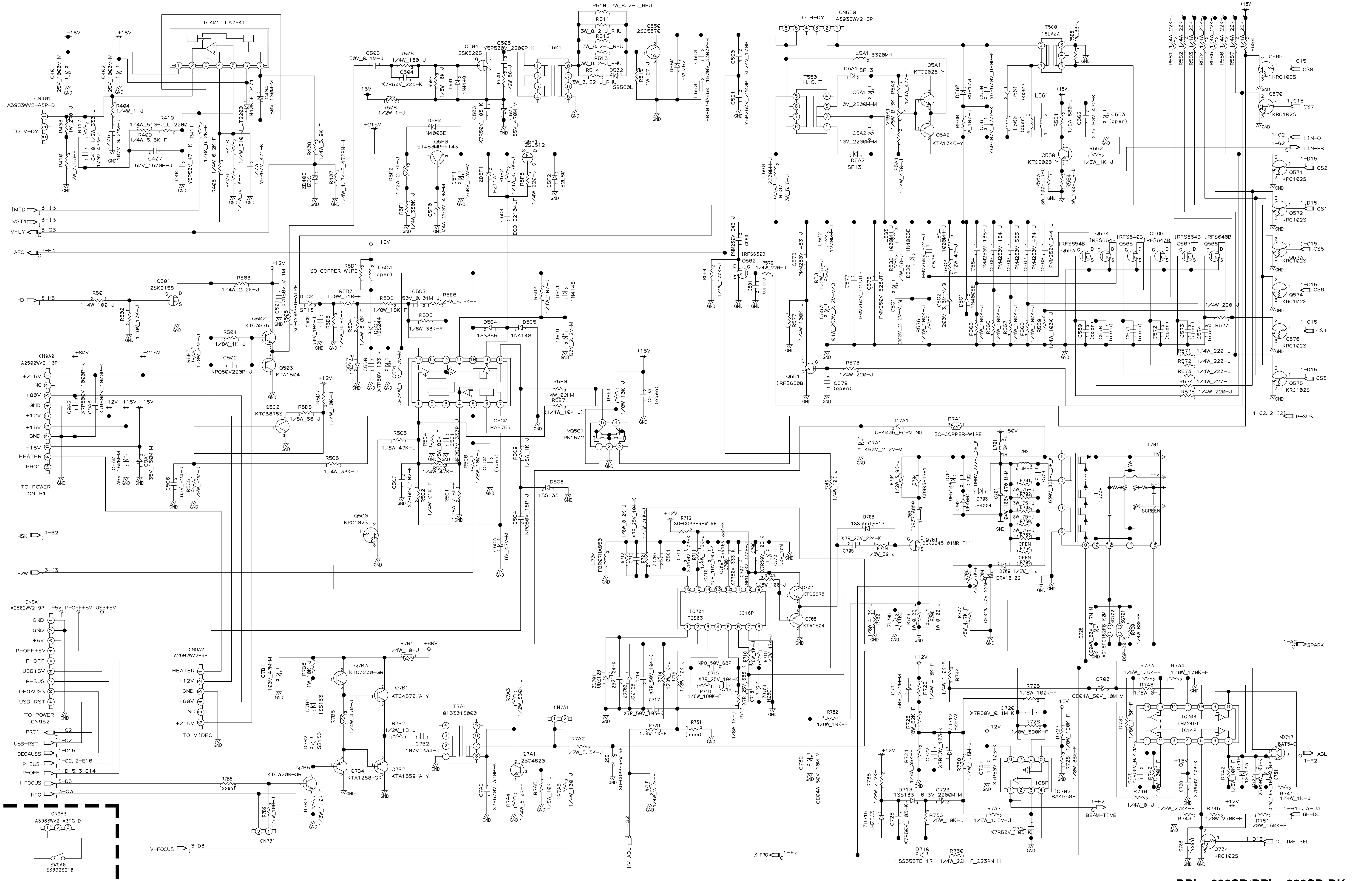
SCHEMATIC DIAGRAM
POWER



IC102	R140
HD64F2128PS20	1/8W 0ohm
HD6432128SWA04PS VD201	OPEN
HD6432128SWA05PS VD301	OPEN

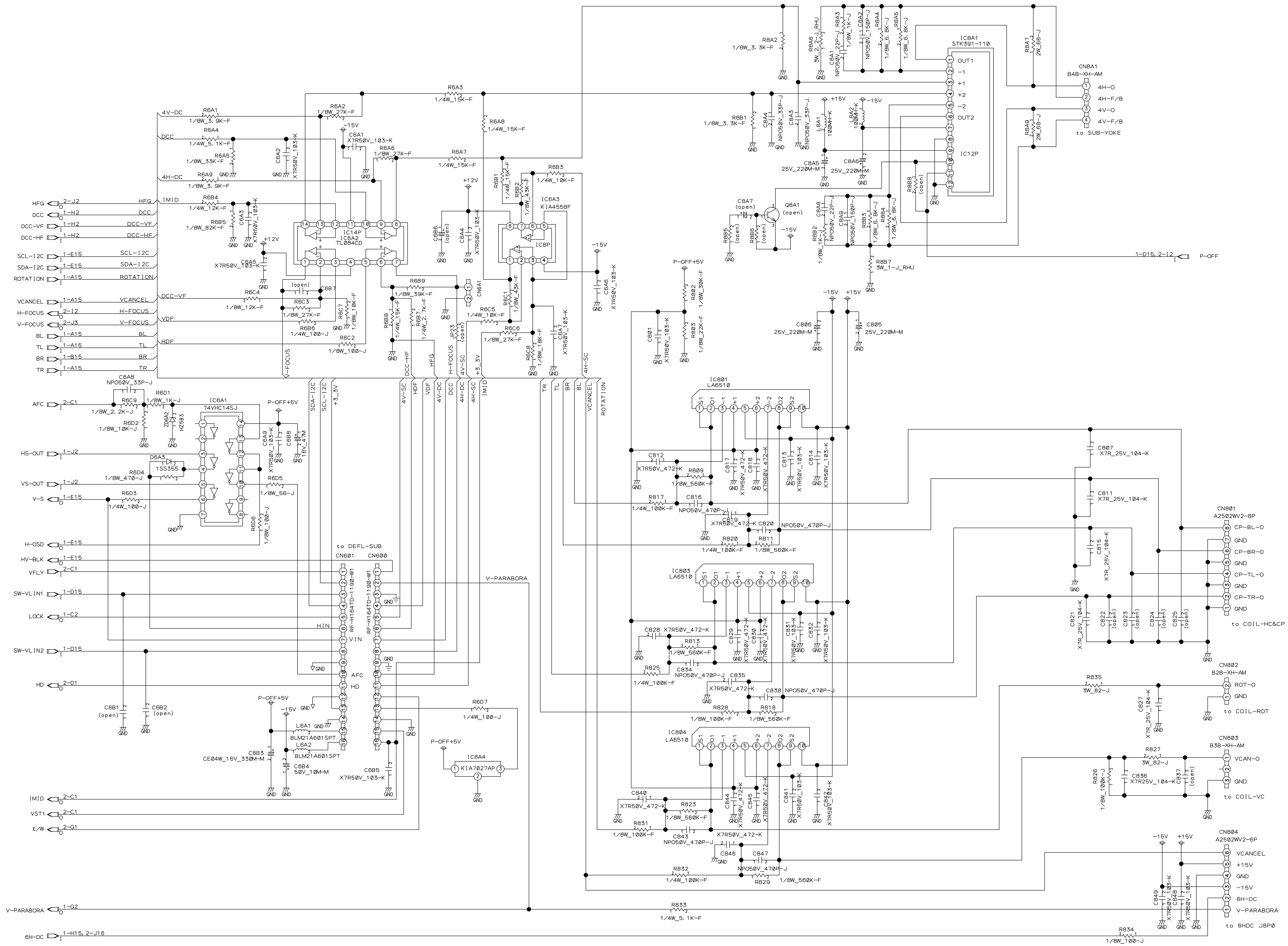
DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM
MAIN (CONTROL)



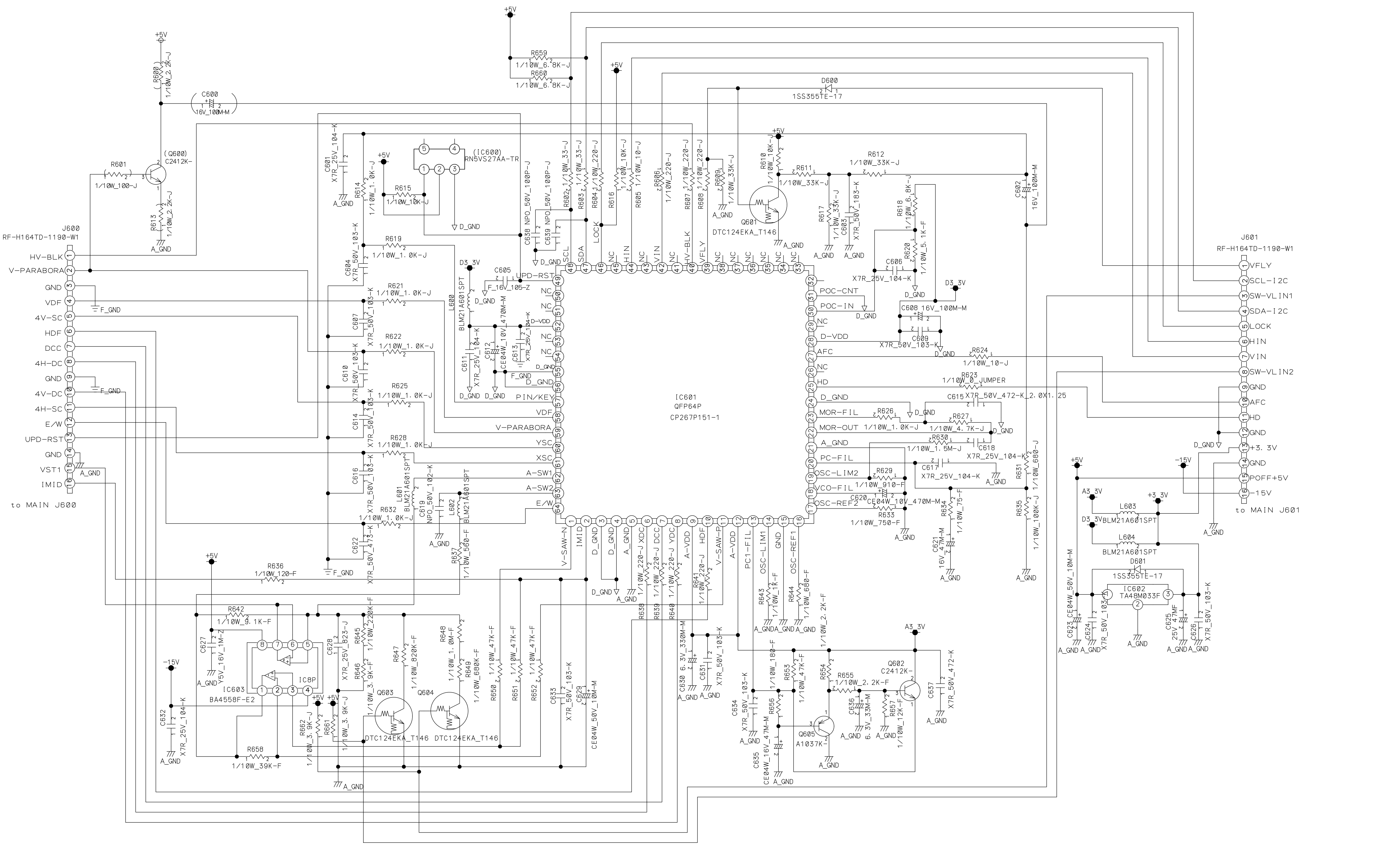
DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM MAIN (DEFL)



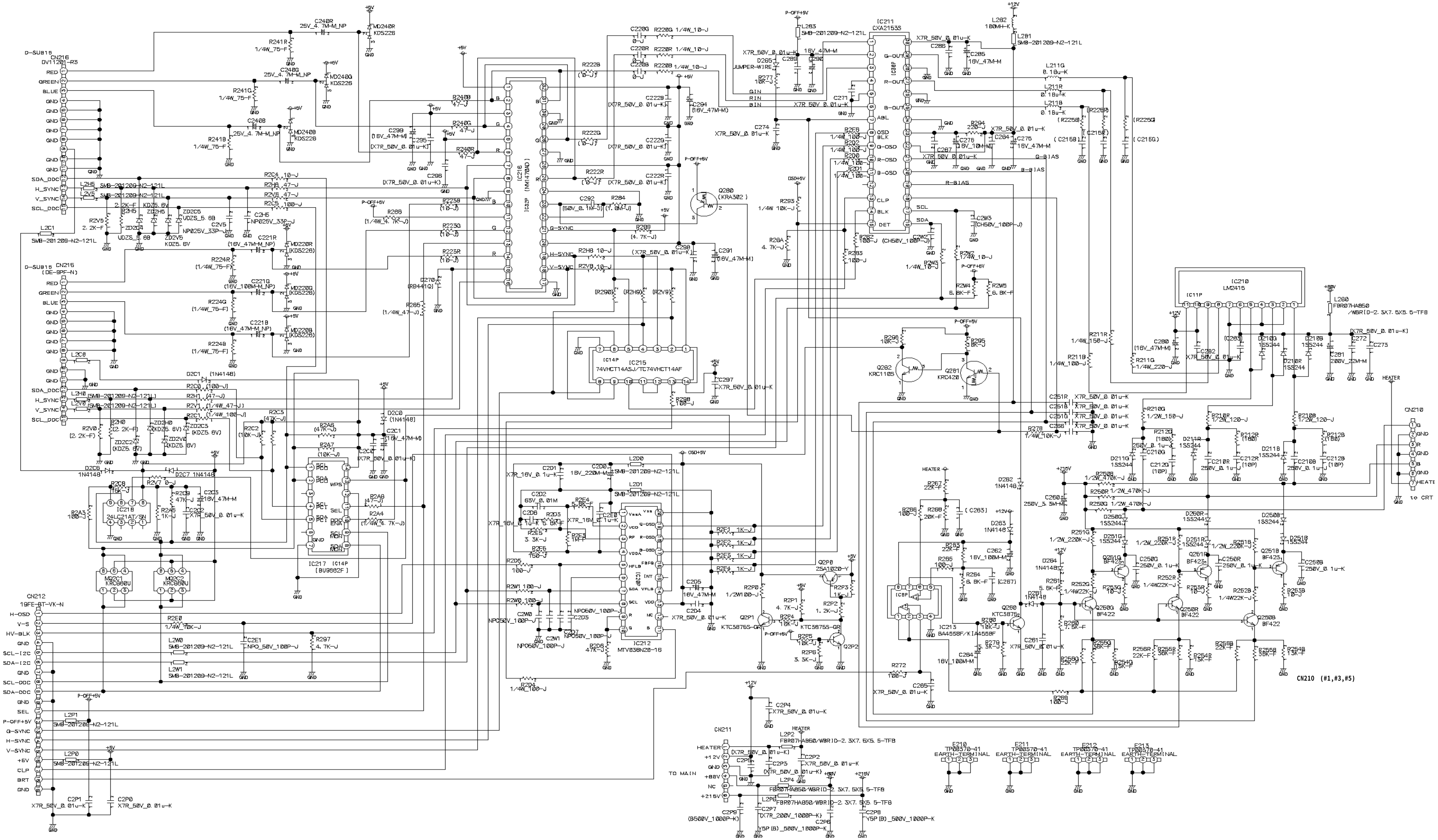
DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM MAIN (DEFL-SUB&COIL-DRIVE)



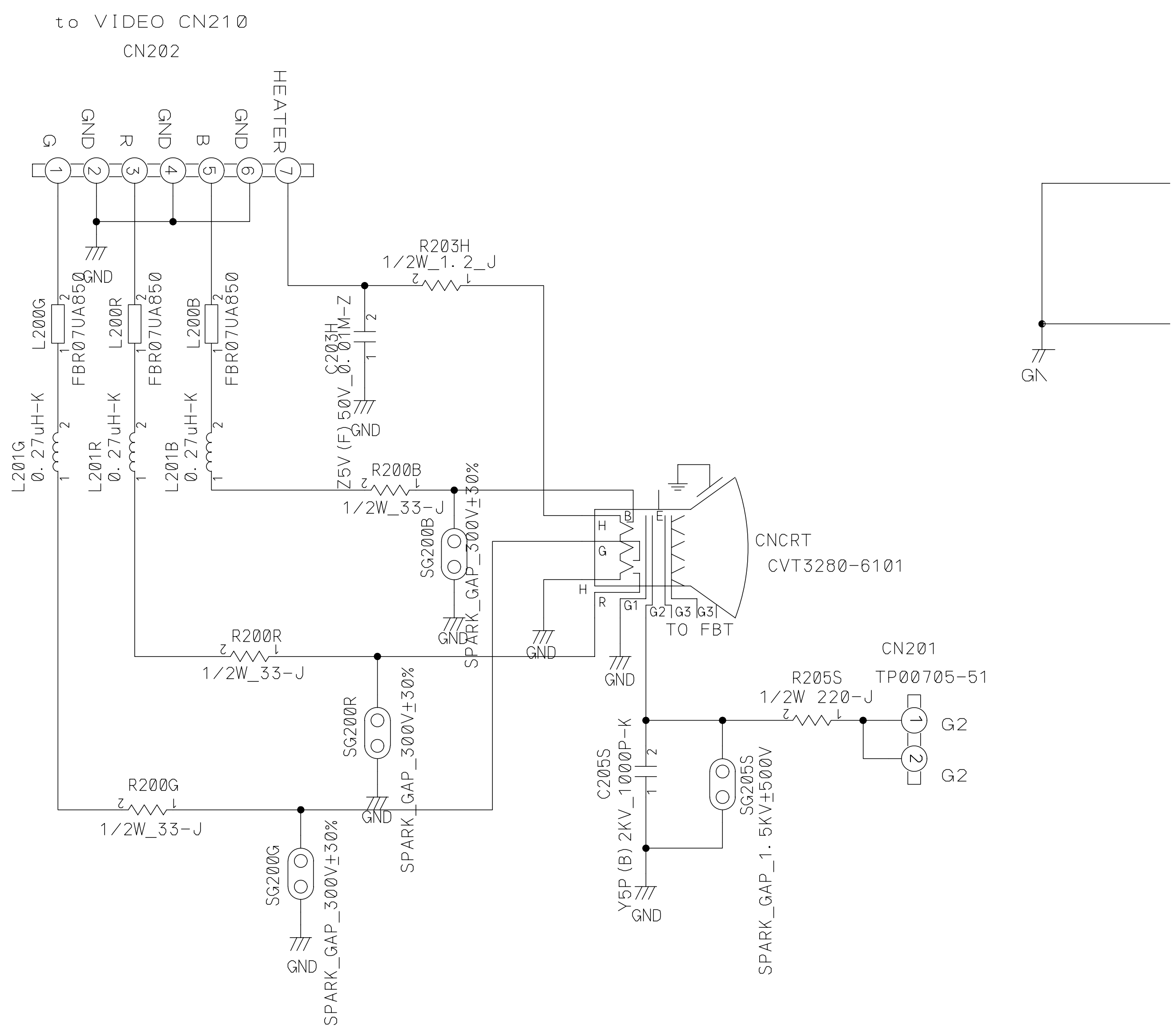
DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM DEFL-SUB	



DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM VIDEO	



DPlus230SB/DPlus230SB-BK

SCHEMATIC DIAGRAM
CRT

6. Removal Instruction Sheet of Bezel and Back cover

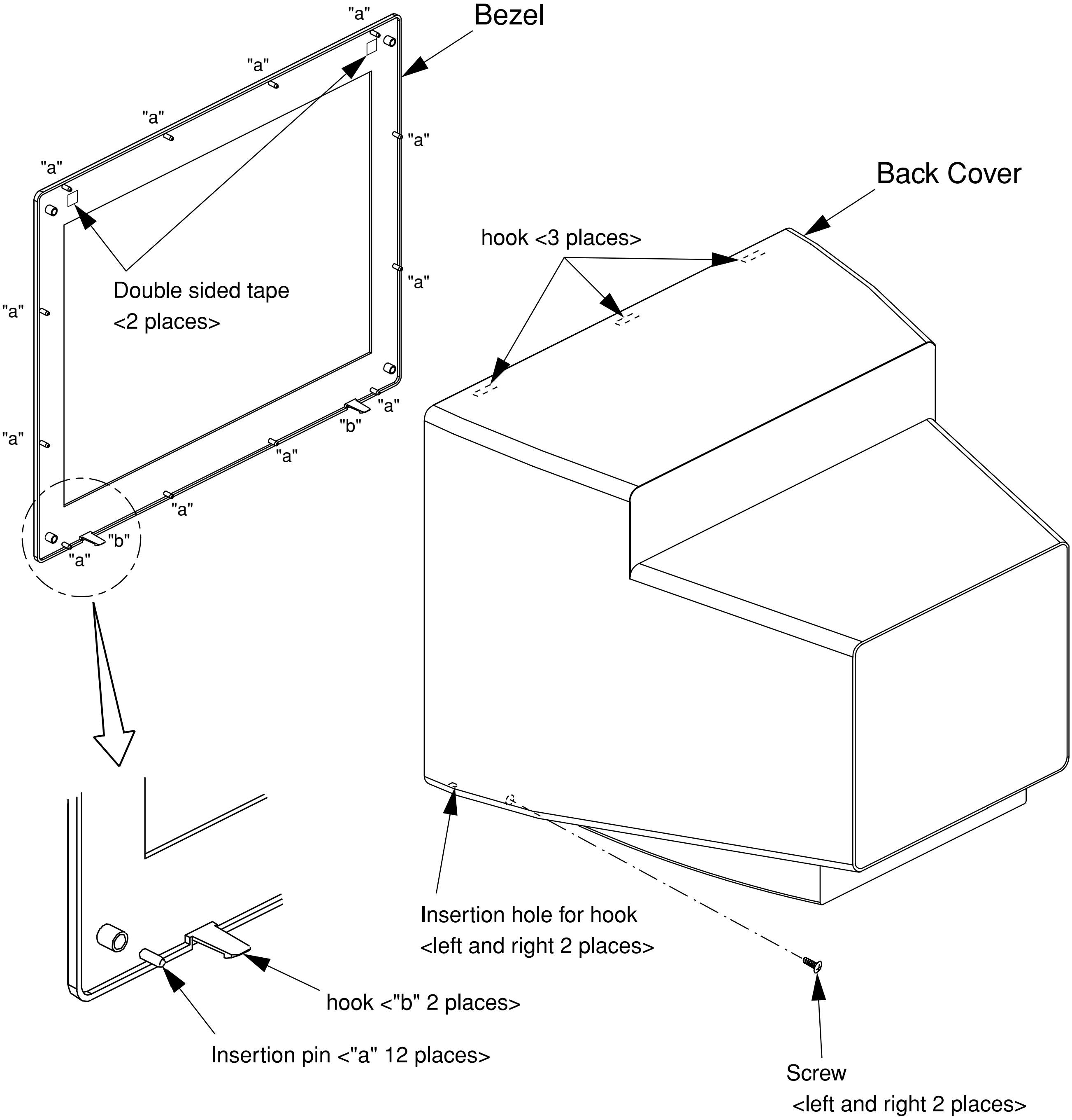
1. Introduction

Please prepare jig for removal.

- Please use as a jig what turned up about 20~30 mm of tapes for crack prevention and stuck them on the tip of a steel board with approx. a thickness of 0.5~ 0.8 mm a width of 15mm, and a length of 150 mm. (As the example, we used ruler made from steel as shown in photograph.)



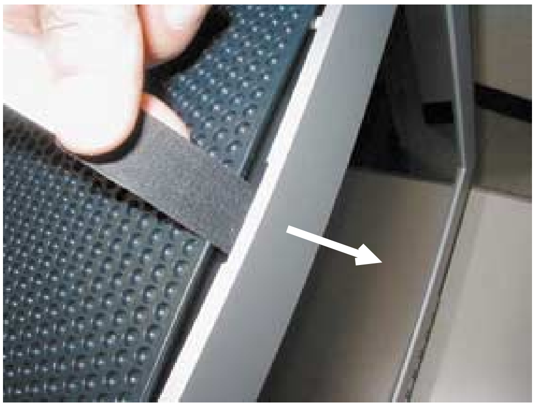
2. Structure Details of Bezel and Back Cover



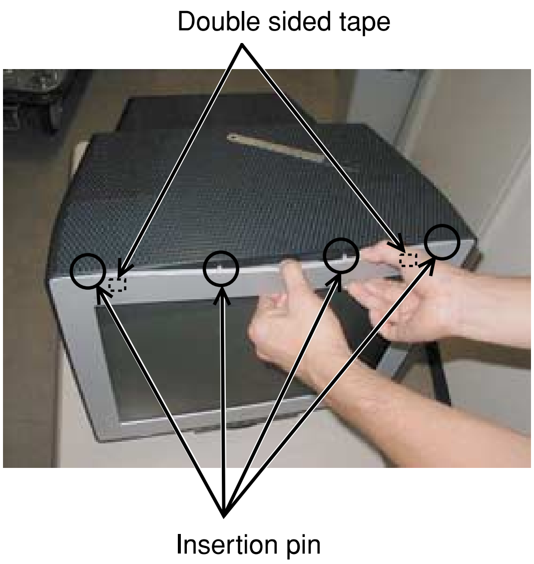
3. Removal Instruction for Bezel

(1) A jig is inserted in the center of the Bezel upper part, and it pushes out.



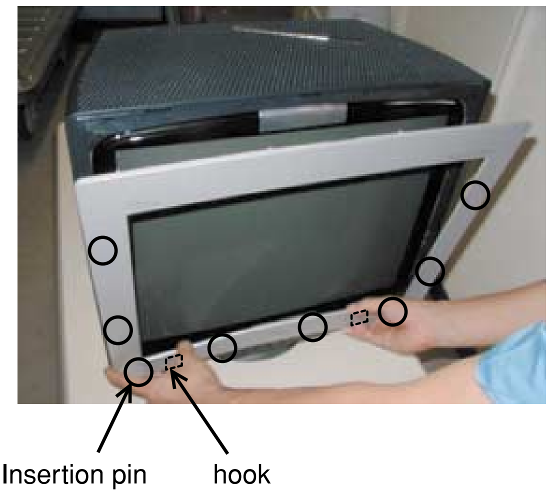


(2) The insertion pin of the four upper parts and two double-sided tapes are removed pulling the upper part of Bezel slowly.





(3) Two insertion pin right and left each of a side part, and lower four insertion pins and two hooks are also pulled slowly, and removed Bezel.

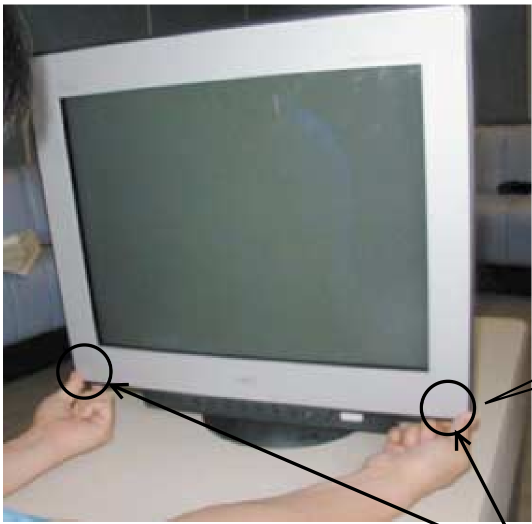
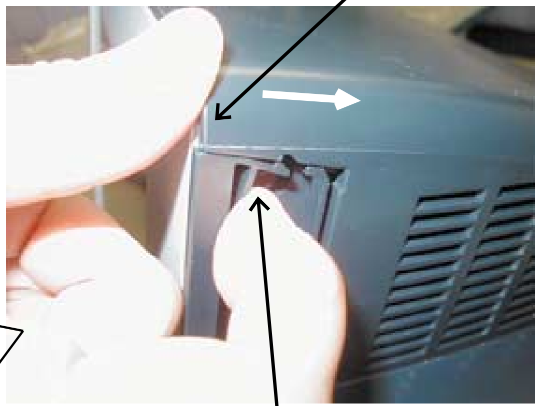




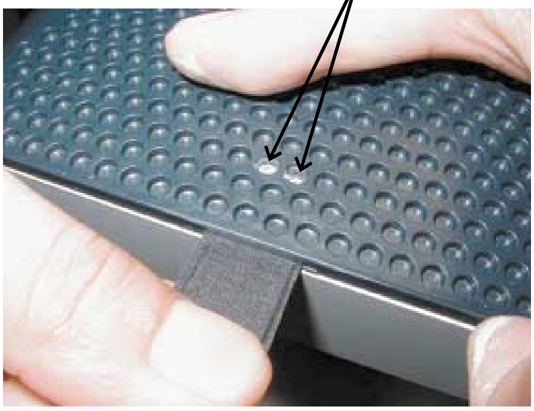
4. Removal Instruction for Back Cover

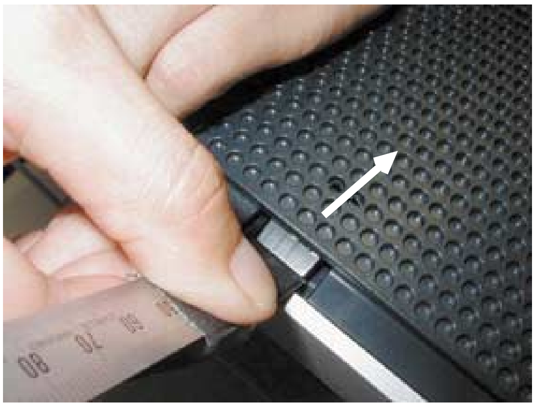
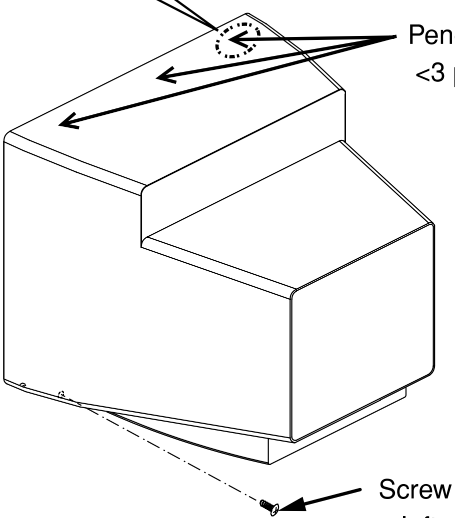
(1) The screws of the two places of the lower parts of the Back Cover are removed.

(2) Two hooks of the front lower part of Back Cover is pressed down, and the lower part of Back Cover is removed.

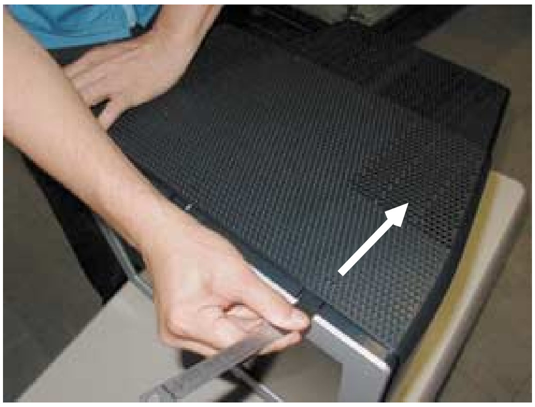
(3) Hooks are removed by considering the penetration hole (three places) of the front upper part of Back Cover as a mark, inserting a jig from the direction of an end. and pushing in a jig downward.



(4) If one hook part place of an end is removed, the others are depressed with a jig to remove hooks simultaneously and also Back Cover is pulled back to remove.

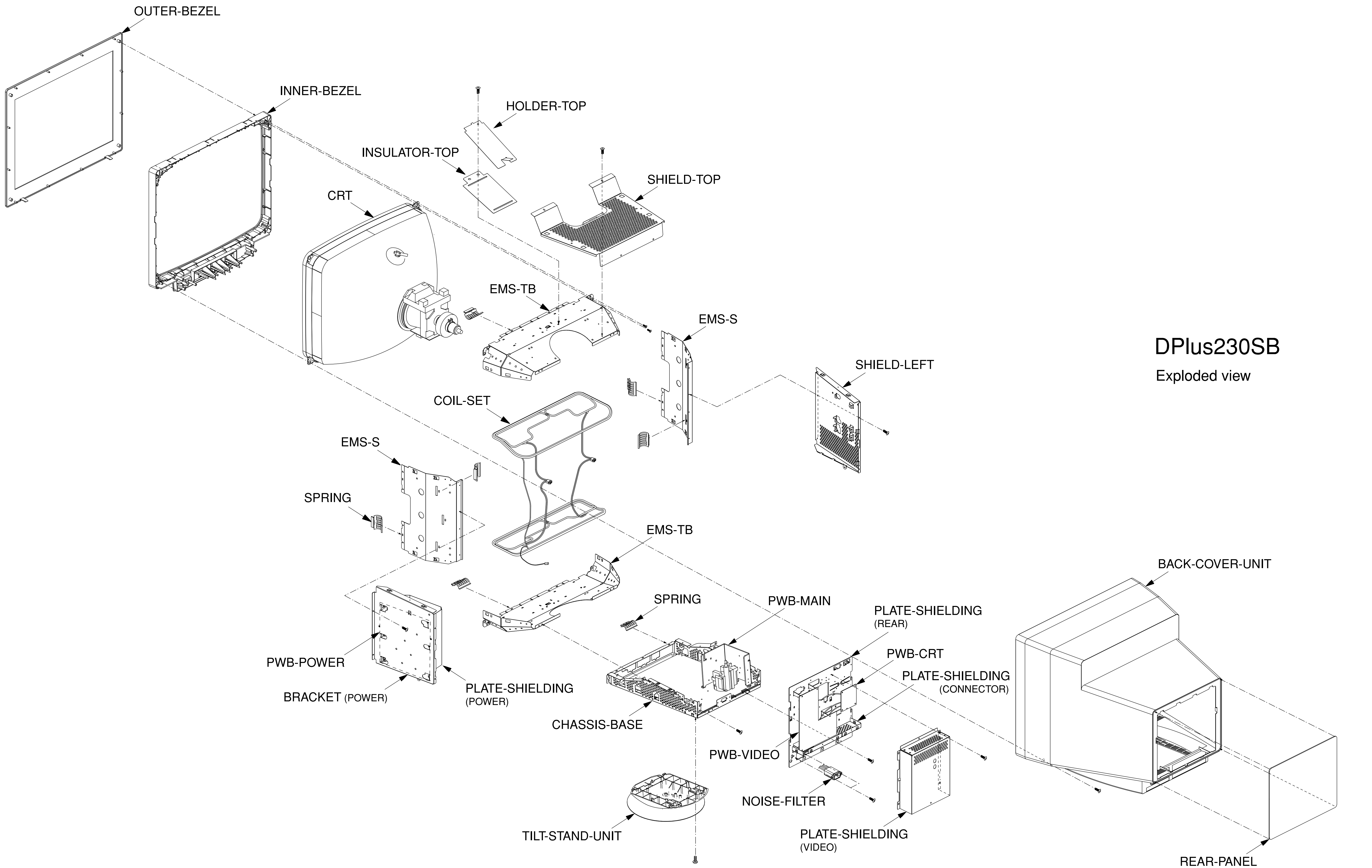






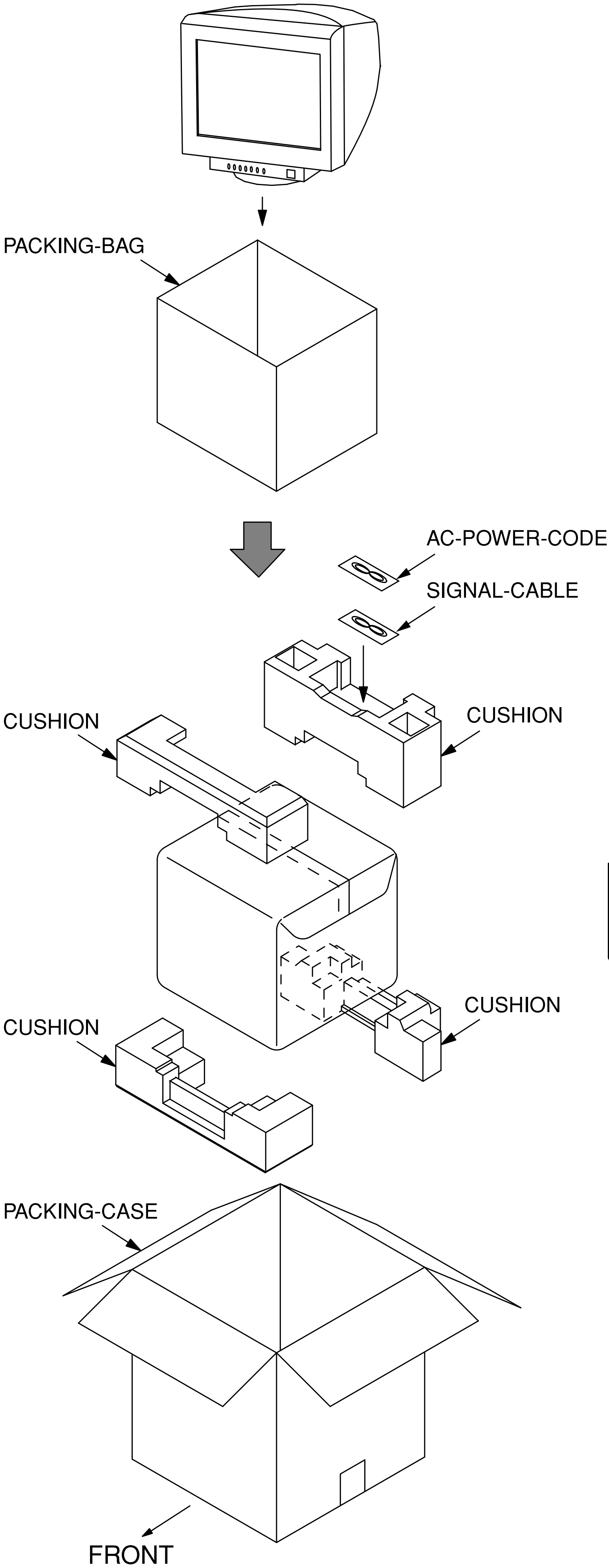
DPlus230SB

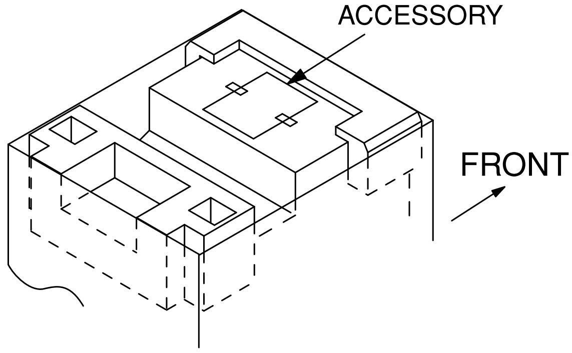
Exploded view

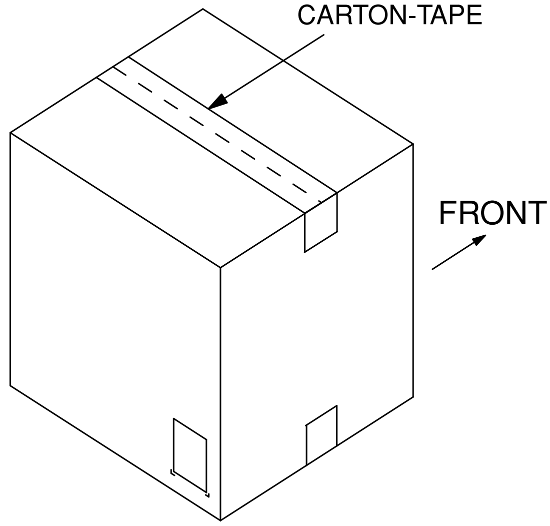


DPlus230SB

Packing view





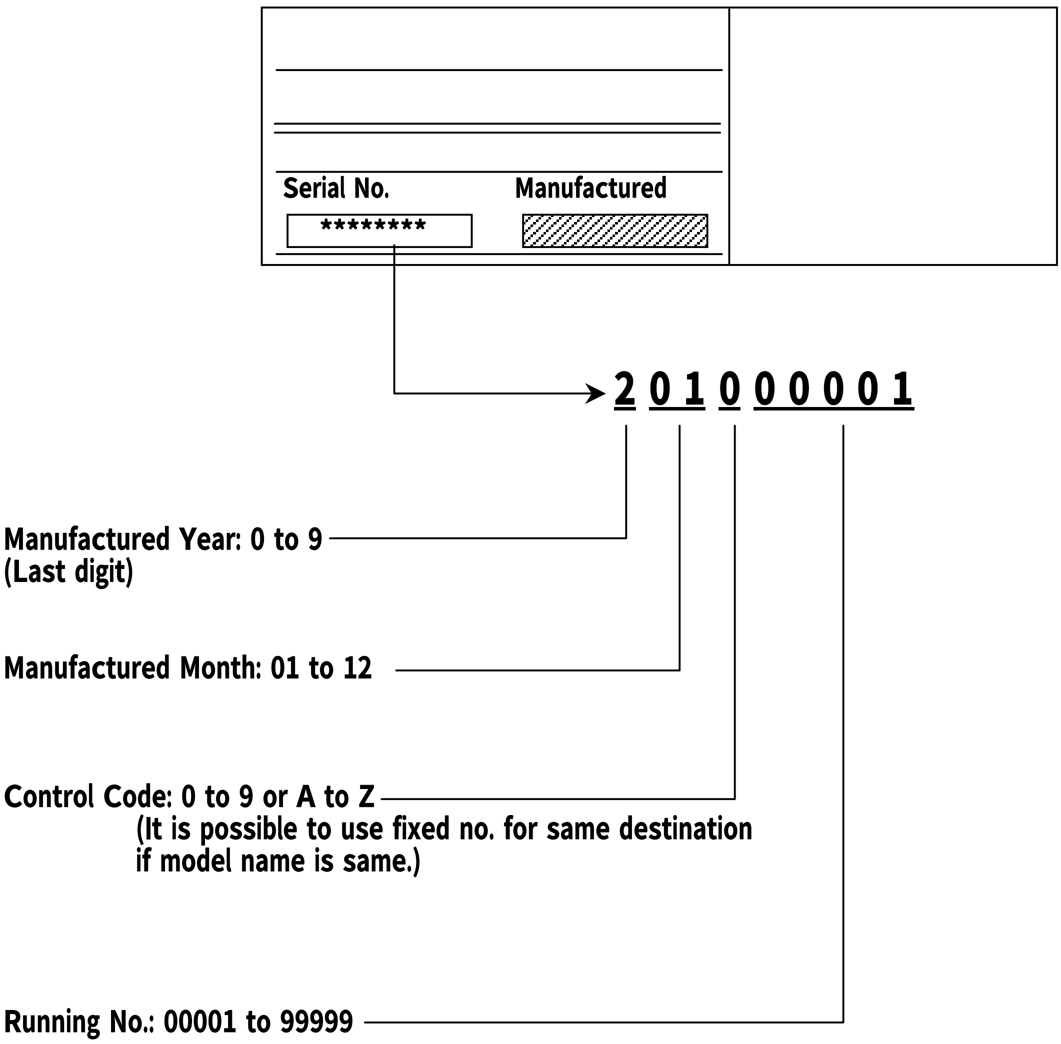


SERIAL NUMBER INFORMATION

Refer to the serial number information shown below.

Ex.) Rating label

Model name: Diamond Plus 230SB / Diamond Plus 230SB-BK
Model NO.: C22BW701



NEC/MITSUBISHI
NEC-MITSUBISHI ELECTRIC VISUAL SYSTEMS

TECHNICAL SPECIFICATION

FOR

55cm/51cmV (22"/20"V) HIGH RESOLUTION
DIGITAL CONTROL AUTO-TRACKING
COLOR DISPLAY MONITOR

MODEL NAME : Diamond PLUS 230SB
Diamond PLUS 230SB-BK

MODEL NUMBER: C22BW701

DATE: June 26, 2002

NEC-MITSUBISHI ELECTRIC VISUAL SYSTEMS CORPORATION

DOCUMENT No	VSP-C486

REVISE	

TABLE OF CONTENTS

***Design and specifications are subject to change without any notice**

1. Foreword

1.1 General Description(Quick Reference)

NO	TYPE			NMVISUAL STANDARD	REMARKS
1	CRT	Size		55cm / 51cmV (22" / 20"V)	Diamondtron U2
		Grill Spacing(PhosphorSpacing)		0.24mm (0.25mm)	Aperture Grille
		Phosphor Type		B22 (EBU)	
		Face-plate		G-WARAS	
		Electron Gun Type		U-NX-DBF	
		Face-plate Transmission		38.4 %(Including face-plate coating)	
2	SCANNING	Horizontal Freq.		30k - 115kHz	
		Vertical Freq.		50 - 160Hz	
3	SIGNAL INPUT	Video Sync.		Analog	0.7Vp-p
				Composite Sync.	TTL Nega
				Separate Sync.	TTL Posi / Nega
		Termination (Impedance)	Video	75 ohm to Ground	
			Sync.	2.2k ohm to Ground	
4	VIDEO	Maximum supported pixel clock		300MHz	
5	SCREEN CHARACTERISTICS	Display Resolution		1920x1440@76Hz(Maximum Resolution) 1600x1200@85Hz(Recommended Resolution)	Addressable
		Display size	Horizontal	396mm	
			Vertical	297mm	
		Misconvergence		Center: 0.25 mm, Corner: 0.35 mm	
		Brightness (Full White)		100cd/m2 at 9300K (Back Raster Luminance: Approx. 0.3cd/m2)	
		SB Mode (Super Bright Mode)		Super Bright Mode1: Picture Super Bright Mode 2 : Movie	(With Gamma) (With Gamma And Sharpness)
6	CONTROL (User Controls)	Front		Power Button, EXIT Button, Control Select Buttons, Control Buttons (Function Adjust), Select Button (Sub: SB Mode), Reset Button	
			OSD	Brightness, Contrast, Degauss, Constant Brightness, Auto adjust, Left/Right, Down/Up, Narrow/Wide, Short/Tall, Color Control, In/Out, Left/Right, Tilt, Align, Rotate, Corner Correction (Top, Top-Balance, Bottom, Bottom -Balance), Moire Canceller, Convergence (Horizontal, Vertical), Linearity (Vertical, Vertical-Balance), Global sync (Top Left, Top Right, Bottom Left, Bottom Right), Language, Osm Position, Osm Turn Off, Osm lock Out, IPM, Edge Lock, Hot key, Factory preset, Display Mode, Monitor Info, Refresh Notifier	
7	CONNECTOR	Power Input		3P IEC Plug	Auto-select
		Signal Input		Dsub-15P	
8	POWER SUPPLY	Operating range		AC100 - 120V / 220 - 240V, 50 / 60 Hz	
		Power consumption (typical.)		125W 1.25A@100-120VAC 0.6A@220-240VAC Power Save: <=2W	
9	ENVIRONMENTAL CONDITION	Operating temperature		5 - 35degrees C	
		Relative humidity		10 - 90% (without condensation)	
10	WEIGHT			Approx. 29.6kg (65.3lbs)	
11	CABINET	With Tilt / Swivel stand		NM Visual standard	
12	REGULATION	Safety		UL / C-UL, TÜV-GS, CCC (For only china model), GOST-R	
		EMC		FCC-B, DOC-B, EN55022-B, EN55024, EN61000-3-2, EN61000-3-3, VCCI-B, CCC (For only China model), GOST-R	
		X – Ray		DHHS, RöV, HWC	
		VLF / ELF		MPR-II, MPR-III, TCO'91	
		Power Management		Energy Star, GEEA LABEL	
		Ergonomics		TÜV-GS, TÜV-Ergo	
		Miscellaneous		TCO'99, TCO'95, CE Marking, JPHG	
13	OTHERS	Plug & Play		DDC2B	
		Digital Dynamic Convergence			
		Communication		Asset Management	
		Others		DDC/CI	

1.2 Regulations

MODEL NAME	REGULATIONS						
	SAFETY	EMC	X-RAY	ELF/VLF	Power Management	Ergonomics	Miscellaneous
DP230SB / DP230SB-BK (C22BW701)	UL C-UL TÜV-GS CCC GOST-R	FCC-B DOC-B EN55022-B EN55024 EN61000-3-2 EN61000-3-3 VCCI–B JPHG CCC GOST-R	DHHS HWC RöV	MPR-II MPR-III TCO'91	Energy Star GEEA LABEL	TÜV-GS TÜV-Ergo	TCO'99 (DP230SB) TCO'95 (DP230SB-BK) CE Marking JPHG

UL	UL1950 3rd Edition
C-UL	CAN/CSA-C22.2 NO.950: 1995
TÜV-GS	EN60950: 1992 & AD1/AD2/AD3/AD4/AD11 & EK1-ITB 2000
FCC	47 CFR Part15 Subpart B, Class B
DOC	Interference-Causing Equipment Standard ICES-003 Issue 3, Class B
DHHS	21CFR Chapter I Subchapter J
HWC	Radiation Emitting Devices Regulations Chapter 1370
RöV	RöV Vom 8.1. 1987
MPR-II	MPR 1990:8
MPR-III	prEN 50279
TCO'99	TCO'99 Certification Requirements for environmental labeling of personal computers
TCO'95	TCO'95 Certification Requirements for environmental labeling of personal computers
CE-Marking	EN60950: 1992 & AD1/AD2/AD3/AD4/AD11 EN55022: 1998 Class B EN55024: 1998 EN61000-3-2: 1995 & AD1/AD2 EN61000-3-3: 1995
Energy Star	International Energy Star office Equipment Program
VCCI	Guide to membership of Voluntary Control Council for Interference By data Processing Equipment and Electronic Office Machines, Class B.
JPHG (Japan Power Harmonics Guidelines)	
	Guidelines for the suppression of Harmonics in Appliances and General - Use Equipment
GEEA LABEL	Award Criteria for the Energy Label: 2002
TÜV-Ergo	prEN 50279 ISO 9241-3:1992 ISO 9241-7:1998 ISO 9241-8:1997
CCC (For only China model)	
	China Compulsory Certification GB4943-1995 GB9254-1998
GOST-R	Russian Safety Certification

2. CRT Specifications

CRT model no.	M51LVT42X
Type	Diamondtron U2 (Aperture Grille)
Size	55cm / 51cm Diagonal View able Image (22" /20" Diagonal View able Image)
Grille Spacing	0.24mm
Phosphor Spacing	0.25mm
Deflection Angle	90 degree
Phosphor Type	B22 (Medium short persistence)
Electron Gun Type	U-NX- DBF
Face-plate Transmission	Approx. 38.4% (Include Face-plate coating)
Face-plate	G-WARAS Coating (Anti-reflection, Anti-glare and Anti-static)
Screen Phosphor Area	406.1 x 304.6 mm
Face-plate Curvature	H: R= 50000 mm, V: R= 80000 mm
Phosphor Color Coordinate	R: X=0.627,Y=0.341 G: X=0.292,Y=0.605 (Typical) B: X=0.149,Y=0.072

3. Electric Specifications

3.1Deflections

Horizontal	Scanning Frequency	30 - 115kHz
	Back Porch	>=1.1 µsec
	Blanking	>= 2.0 µsec
	H-sync Width	>= 0.6 µsec
Vertical	Scanning frequency	50 - 160Hz
	V-sync + V-back Porch	>= 400 µsec
	V-sync Width	3H <= Vs <= 10H---over 50kHz (fh) 2H <= Vs <= 10H---up to 50kHz (fh)
	V-Total Line	>= 256H + V-sync Width

(*) Full screen adjustment may not be available for the timing which
Tdh / Th < 72% - Over 100kHz (fh)
Tdh / Th < 74% - Up to 100kHz (fh)
Tdh: Horizontal Display Time
Th: Horizontal Scanning Time

3.2 Signal Input

Video Input Signal	R.G.B analog
Sync. Input Signal	External composite sync. , Negative TTL External HD/VD separate sync. TTL (N or P)
Video Input Impedance	75ohm to ground
Sync. Input Impedance	2.2kohm to ground
Signal Level	Video signal: 0.7V p-p + 10% / - 5% Separate H/V-sync. : TTL level (>2.5Vp-p)

3.3 Video Performance

Maximum supported pixel clock	300MHz
Pulse Rise and Fall time	5.5nsec(typical.) 10 to 90% at 35Vp-p

*The rise and fall time of the input video signal is 2.0nsec or less.
*The pulse rise or fall time is determined using the formula

$$Ta = \sqrt{Tm^2 - (Ts^2 + Tp^2 + Tsc^2)}$$

Where: Ta = Amplifier rise / fall time
Tm = Measured rise / fall time
Ts = Input signal rise / fall time
Tp = Probe effect on rise / fall time = 2.2 x Rl x Cp
Rl = Amplifier output resistance (ohm)
Cp = Total probe capacitance (F)
Tsc = Scope rise / fall time = 0.35 / Scope bandwidth (MHz)

3.4 Power Supply

Input Voltage	100 - 120 / 220 - 240 VAC +/- 10%
Frequency	50/60Hz +/- 3Hz
Power Consumption (typical.)	125W 1.25A@100-120VAC 0.6A@220-240VAC
AC leakage current	<= 3.5mA
Inrush current	<=70A 0-peak at 240VAC on cold starting

3.5 Power Saving

	H-sync	V-sync	Video	Power Consumption	Recovery Time	LED Indicator
Power Saving OFF	On	On	Active	125W		Green
Power Saving ON	Off	On	Blank	<= 2W	Approx.5 sec	Orange
	On	Off	Blank			
	Off	Off	Blank			

3.6 Degaussing

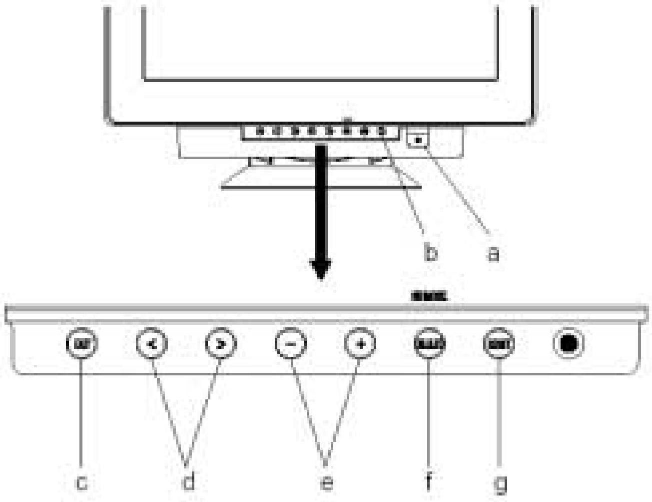
Auto Degaussing	The monitor have an automatic degaussing function which activates when the unit is turned on.
Manual Degaussing	This activates degaussing at the user's discretion after the unit is Operating

*The Monitor requires minimum 15 minutes after last degauss operation for full degauss capability

4.Functions

4.1 Front Controls

a: POWER SWITCH
b: POWER-ON INDICATOR
c: EXIT BUTTON
d: CONTROL (ITEM) SELECT BUTTONS
e: CONTROL (FUNCTION ADJUST) BUTTONS
f: SELECT (SB MODE) BUTTON
g: RESET BUTTON



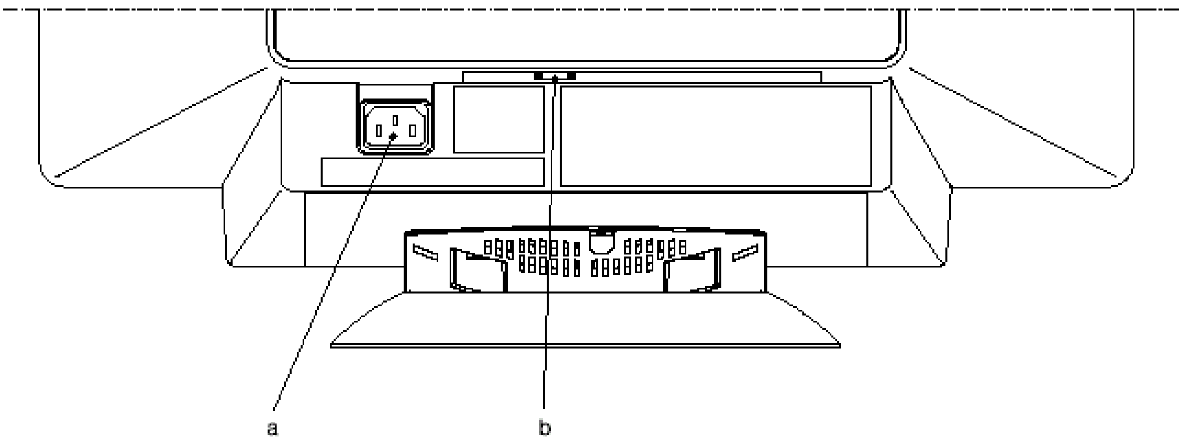
4.2 OSD (On Screen Display) Function

OSD1 Group			**Default**
BRIGHTNESS		BAR	30.10%
CONTRAST		BAR	100.00%
DEGAUSS		SELECT	-
CONSTANT BRIGHTNESS		SELECT	-
OSD2 Group			**Default**
AUTO ADJUST		SELECT	-
LEFT / RIGHT		BAR	Adjusted
DOWN / UP		BAR	Adjusted
NARROW / WIDE		BAR	Adjusted
SHORT / TALL		BAR	Adjusted
OSD3 Group			**Default**
COLOR CONTROL		1:9300K 2:8200K 3:7500K sRGB 5:5000K	1:9300K
COLOR TEMPERATURE		5000K - 9300K	9300K
R/G/B GAIN CONTROL		BAR	Adjusted
OSD4 Group			**Default**
IN / OUT		BAR	Adjusted
LEFT / RIGHT		BAR	Adjusted
ALIGN		BAR	Adjusted
TILT		BAR	Adjusted
ROTATE		BAR	Adjusted
Corner Correction	TOP	BAR	Adjusted
	TOP-BALANCE	BAR	Adjusted
	BOTTOM	BAR	Adjusted
	BTM-BALANCE	BAR	Adjusted
OSD5 Group			**Default**
MOIRE CANCELER		BAR	0.00%
Convergence	Hor.	BAR	Adjusted
	Ver.	BAR	Adjusted
Linearity	Ver.	BAR	Adjusted
	VERTICAL BALANCE	BAR	Adjusted
GLOBAL SYNC	TOP LEFT	BAR	Adjusted
	TOP RIGHT	BAR	Adjusted
	BOTTOM LEFT	BAR	Adjusted
	BOTTOM RIGHT	BAR	Adjusted

OSD6 Group		**Default**
LANGUAGE	ENG/DEU FRA/ESP ITA/JPN	ENG
OSM POSITION	CENTER TOP LEFT TOP RIGHT BOTTOM LEFT BOTTOM RIGHT	CENTER
OSM TURN OFF	5-120 SECONDS	45 SECONDS
OSM LOCK OUT	-	-
IPM OFF MODE	1:ENABLE 2:DISABLE	1:ENABLE
EDGE LOCK	1:FRONT 2:BACK	2:BACK
HOT KEY	1:ON 2:OFF	2:OFF
FACTORY PRESET	PRESS +	-
OSD7 Group		**Default**
DISPLAY MODE	Preset Information	
	Horizontal Frequency	
	Vertical Frequency	
	POLARITY	
INFORMATION	Model	
	Serial Number	
REFRESH NOTIFIER	ON/OFF	OFF

4.3 Back Panel

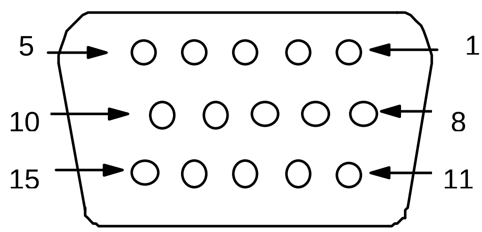
a : AC POWER CONNECTOR (3P IEC Plug)
b : SIGNAL INPUT CONNECTOR (Dsub-15P)



4.4 Connector Pin Assignment

1) Signal Input Connector (Dsub-15P)

Pin	Signal
1	Red-video
2	Green-video
3	Blue-video
4	Gnd
5	DDC Gnd
6	Red Gnd
7	Green Gnd
8	Blue Gnd
9	+5VDC(from Computer)
10	Sync Gnd
11	Gnd
12	Serial data
13	H-sync or Composite sync
14	V-sync (V-clock)
15	Serial clock



Rear Panel

4.5 DDC (Display Data Channel) Functions

VESA DDC2B.
See Appendix2 for EDID data.
VESA DDC/CI

4.6 Preset Timing

Factory-preset: 9 see Appendix 1 for detail timing parameters.
User-preset: 16

Preset Timing Discrimination

Horizontal Frequency	>=1kHz
Vertical Frequency	>=1Hz
Sync Signal Polarity	H or V-sync signal polarity is different.

*The monitor is able to discriminate input signals
by at least one of above parameters

5. Display Quality

5.1 Test Conditions

AC Voltage	120VAC 60Hz or 230VAC 50Hz
Video Signal	1600 x 1200 (106kHz, 85Hz) 0.7Vp-p
Warm Up	More than 30 min. with full white picture
Temperature	20 - 25 degree C
Relative Humidity	40 - 80%
Magnetic Field	BH=0, BV=0.040mT
Contrast & Brightness	Contrast maximum and Brightness center position (Back Raster Luminance: Approx. 0.3cd/m2)
Color Temperature	Color-1: 9300K + 8 M.P.C.D.
Display Size	396 x 297mm
Ambient light	200 +/- 50 lx
Luminance Meter	Minolta CA100 or Equivalent

*Unless specified, the monitor is set at the factory default setting.

5.2 Display size

All preset timing	Width: 396mm, Height: 297mm

5.3 Luminance

Luminance at CRT center	Full White: >=100cd/m2 (at Color No.1) (Brightness center position)
	Window: 80x80mm (at Color No.1) (Brightness: Factory default setting) SUPER BRIGHT MODE OFF: 100cd/m2 (Typical) SUPER BRIGHT MODE-1 ON: 150cd/m2 (Typical) SUPER BRIGHT MODE-2 ON: 170cd/m2 (Typical)
Luminance Variation	Delta Luminance / Center Luminance: <=20%
Back Raster Luminance	Approx. 0.3 cd/m2 (Brightness center position) Approx. 0 cd/m2 (Factory default setting)
	Raster must not visible at minimum Brightness control

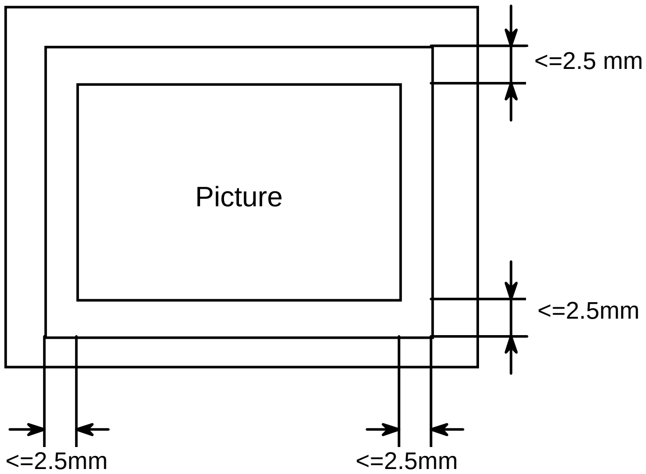
5.4 Color

Color Temperature	Color-1: 9300K + 8 M.P.C.D. X=0.283 +/-0.015 Y=0.297 +/-0.015
	Color-2: 8200K (X=0.290, Y=0.313)
	Color-3: 7500K (X=0.300, Y=0.315)
	sRGB: 6500K (Luminance: 80 +20/-10 cd/m2) (X=0.313, Y=0.329)
	Color-5: 5000K + 8 M.P.C.D. X=0.345 +/- 0.015 Y=0.359 +/- 0.015
White Uniformity	<= 0.015: in either the X or Y shift between the center and peripheral area
Color Tracking	Contrast Control: +/-0.020 from 25cd/m2 to Maximum at center Brightness position

5.5 Distortion

Distortion Except rotation and centering	H: <= 2.5mm, V: <= 2.5mm

*With Green-Crosshatch applied.
*The overall distortion is defined as the total of all image distortion excluding rotation and display centering.

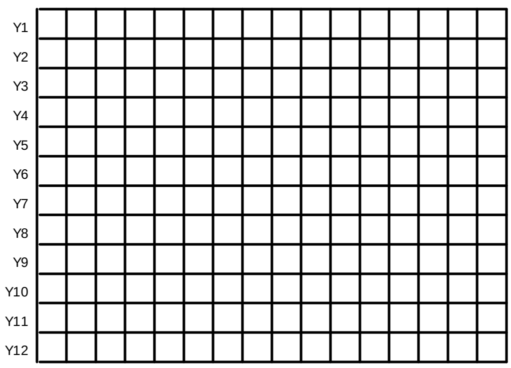


5.6 Linearity

Linearity	H: <=15%(30-40k), <=12%(40-60k), <=10%(60-115k) adjacent: <= 7%
	V: <=10% adjacent: <= 7%

*At preset timings
*With Green-Crosshatch (17 lines horizontally by 13 lines vertically) applied.
*The formula used to calculate linearity is

$$\frac{Xmax - Xmin}{(Xmax + Xmin)/2} \times 100\% \qquad \frac{Ymax - Ymin}{(Ymax + Ymin)/2} \times 100\%$$

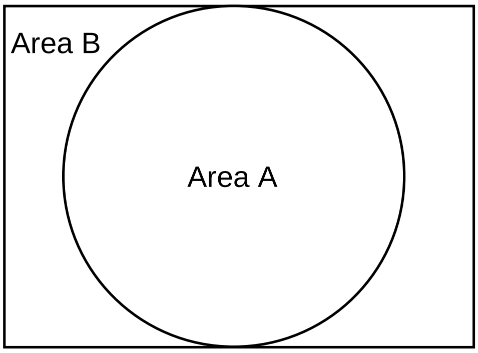


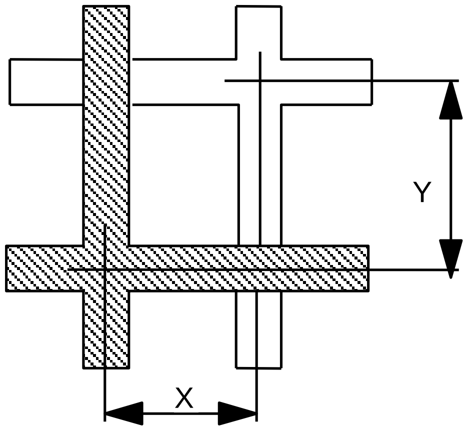
X1=X2=X3= --- =X16
Y1=Y2=Y3= --- =Y12

5.7 Misconvergence

Misconvergence	Area A: <= 0.25 mm within the 297mm diameter circle
	Area B: <= 0.35 mm within 396mm x 297mm

*With White-Crosshatch applied.
*Zone A is a circular area with 297mm diameter at the center.
*Zone B is a rectangular area (396mm x 297mm) outside of the zone A.
*Use worst-case horizontal/vertical misconvergence between any two primary colors.





5.8 Focus

<=1600x1200 85Hz	Displaying 7 x 9 pixel "e" with white single pixel Strokes, the entire screen shall be readable with clearly discernible characters at normal viewing distance.
>1600x1200 85Hz	Displaying 7 x 9 pixel "H" with white single pixel Strokes, the entire screen shall be readable with clearly discernible characters at normal viewing distance.

5.9 Raster Regulation

Rater Size Regulation	<= 0.5% of the horizontal or vertical picture size

*The picture size change is less than adjusted value in either the horizontal or vertical direction over 30% to 100% luminance range and 90 - 132VAC or 198 - 264VAC Input respectively.

6. Mechanical Specifications

6.1 Cabinet, Tilt / Swivel Base

Molded material	Cabinet: PC+ABS (Flame Class 5V) Tilt /Swivel Base: ABS (Flame Class HB)
Cabinet color	See Fig.1
Bezel Logo	See Fig.2
Tilt & Swivel	Right & Left: -90degree to +90degree Up & Down: 10degree to –5 degree
Dimension	495mm(W) x 484.5mm(H) x 471mm(D) 19.5"(W) x 19.1"(H) x 18.5"(D) (Include Tilt /Swivel Base, see Fig.1)

6.2 Rating Label

Europe	See Fig.3-1
China	See Fig.3-2

6.3 Carton Box

Paper Material		Kraft liner and trifaced corrugated board (Double wall)
Carton Box Print	Europe	See Fig.5-1
	China	See Fig.5-2
Dimension		See Fig.4
Packing Contents		See Fig.6

6.4 Weight

Net	Approx. 29.6 kg (65.3 lbs)
Gross	Approx. 35.0 kg (77.2 lbs)

6.5 Accessories

AC Power Cord	Europe	See Fig.7-1
	China	See Fig.7-2
Signal Cable		SC-B110: see Fig.8
User's Guide	North America	3 Languages (English, German, French)
	Europe	11 Languages (English, Czech, German, Greek, Spain, French, Italian, Dutch, Polish, Russia, Turkish) Attached CD-ROM
	China	Chinese

7. Environmental Conditions

7.1 Temperature, Relative Humidity

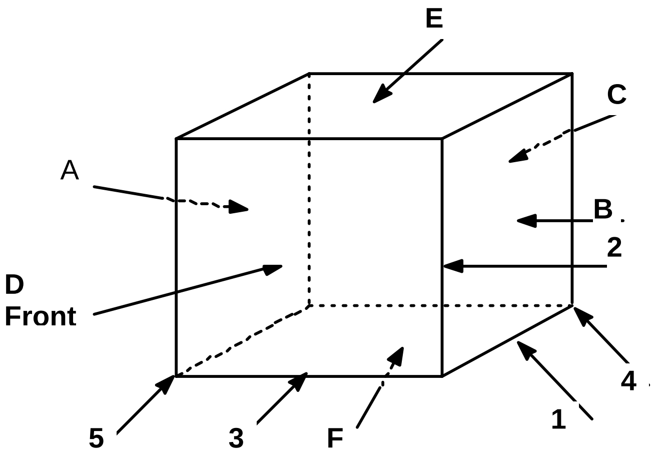
	Operating	Storage and shipment
Temperature	5 – 35 degree C	-20 - 60 degree C
Relative Humidity	10 - 90% Without condensation	10 - 90% Without condensation

7.2 Vibration Test (with carton box)

1) Random Vibration

Test Axis	3 axis
Search Frequency	5 - 200Hz
Acceleration	0 - 14.406m/s2rms
Dwelling Time	30 minutes x 3 axis
Mounting	Fixed firmly on the vibration table

7.3 Drop Test (with carton box)

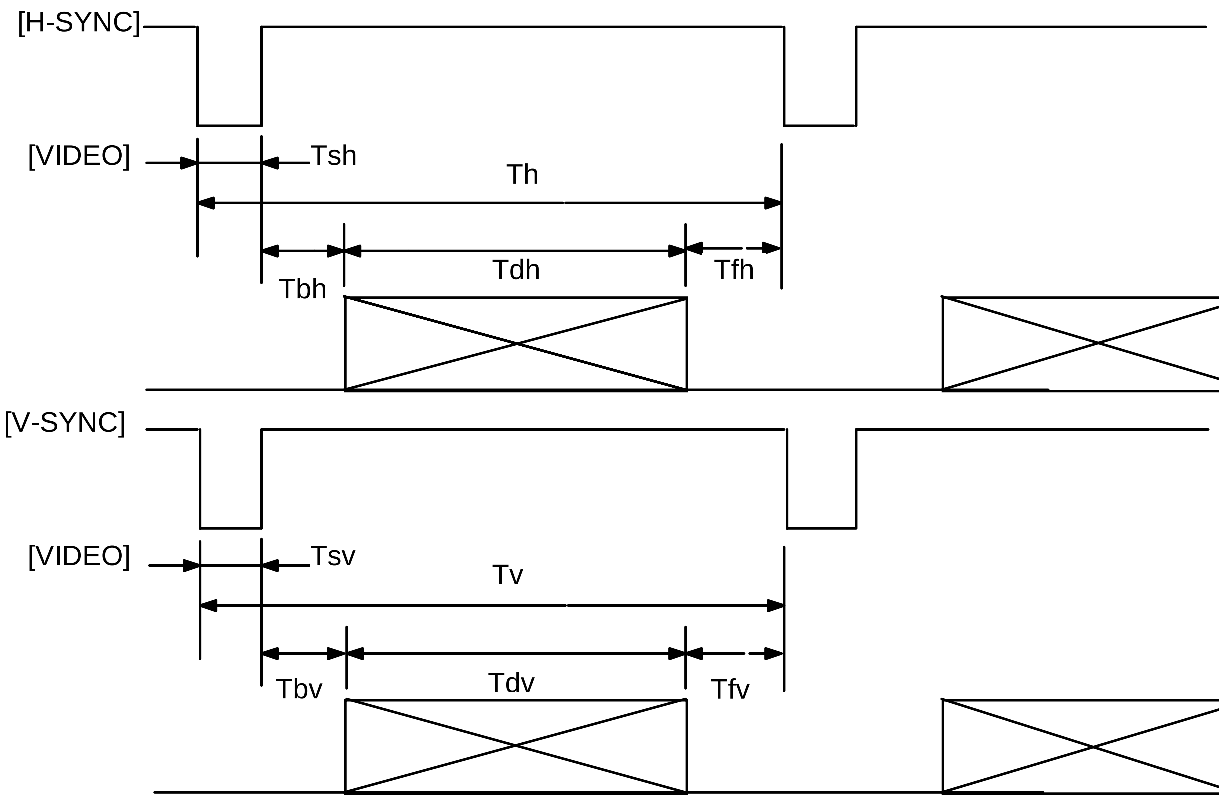


The inside unit shall be withstand without any damage by following procedure.
Drop to the hard wooden board from the position of the following heights.

After finish the drop test of edges (3 position) and also corners (2 position),
tester has to change to new cushion. However for the carton box,
tester must not change to the new box and use the damaged box continuously.

	Position	Height
Edge	1,2,3	46.0cm(18inch)
Corner	4,5	46.0cm(18inch)
Other Surfaces	A, B, C, D	46.0cm(18inch)
Top Surface	E	46.0cm(18inch)
Bottom Surface	F	46.0cm(18inch)

Appendix 1 Preset Timing Chart



NO.	Clock (MHz)	Th (µSEC) (dot)	Tsh (µSEC) (dot)	Tfh (µSEC) (dot)	Tbh (µSEC) (dot)	Tdh (µSEC) (dot)	Tv (mSEC) (line)	Tsv (mSEC) (line)	Tfv (mSEC) (line)	Tbv (mSEC) (line)	Tdv (mSEC) (line)	Hs	Vs	Fh (KHz)	Fv (Hz)	REMARKS
1	25.175	31.778 (800)	3.813 (96)	0.636 (16)	1.907 (48)	25.422 (640)	16.683 (525)	0.064 (2)	0.318 (10)	1.048 (33)	15.253 (480)	-	-	31.469	59.940	VESA 640*480 / 60Hz
2	49.500	21.333 (1056)	1.616 (80)	0.323 (16)	3.232 (160)	16.162 (800)	13.333 (625)	0.064 (3)	0.021 (1)	0.448 (21)	12.800 (600)	+	+	46.875	75.000	VESA 800*600 / 75Hz
3	78.750	16.660 (1312)	1.219 (96)	0.203 (16)	2.235 (176)	13.003 (1024)	13.328 (800)	0.050 (3)	0.017 (1)	0.466 (28)	12.795 (768)	+	+	60.023	75.029	VESA 1024*768 / 75Hz
4	94.500	14.561 (1376)	1.016 (96)	0.508 (48)	2.201 (208)	10.836 (1024)	11.765 (808)	0.044 (3)	0.015 (1)	0.524 (36)	11.183 (768)	+	+	68.677	84.997	VESA 1024*768 / 85Hz
5	135.000	12.504 (1688)	1.067 (144)	0.119 (16)	1.837 (248)	9.481 (1280)	13.329 (1066)	0.038 (3)	0.013 (1)	0.475 (38)	12.804 (1024)	+	+	79.976	75.025	VESA 1280*1024 / 75Hz
6	157.500	10.971 (1728)	1.016 (160)	0.406 (64)	1.422 (224)	8.127 (1280)	11.761 (1072)	0.033 (3)	0.011 (1)	0.483 (44)	11.235 (1024)	+	+	91.146	85.027	VESA 1280*1024 / 85Hz
7	202.500	10.667 (2160)	0.948 (192)	0.316 (64)	1.501 (304)	7.901 (1600)	13.333 (1250)	0.032 (3)	0.011 (1)	0.491 (46)	12.800 (1200)	+	+	93.750	75.000	VESA 1600*1200 / 75Hz
8	229.500	9.412 (2160)	0.837 (192)	0.279 (64)	1.325 (304)	6.972 (1600)	11.765 (1250)	0.028 (3)	0.009 (1)	0.433 (46)	11.294 (1200)	+	+	106.250	85.000	VESA 1600*1200 / 85Hz
9	297.000	8.889 (1640)	0.754 (224)	0.485 (144)	1.185 (352)	6.465 (1920)	13.333 (1500)	0.027 (3)	0.009 (1)	0.498 (56)	12.800 (1440)	-	+	112.500	75.000	VESA 1920*1440 / 75Hz

Appendix 2 EDID data for VESA DDC

EDID DATA DUMP HEX
00 FF FF FF FF FF FF 00
34 AC 31 46 SN SN SN SN
WW YY 01 03 0C 28 1E 78
EB 9C 68 A0 57 4A 9B 26
12 48 4C FF EF 80 31 59
45 59 61 59 71 4F 81 99
A9 4F C1 4F D1 4F A6 59
40 30 62 B0 32 40 40 C0
13 00 8C 29 11 00 00 1E
00 00 00 FD 00 32 A0 1E
73 21 00 0A 20 20 20 20
20 20 00 00 00 FC 00 44
50 6C 75 73 20 32 33 30
53 42 0A 20 00 00 00 FF
00 S2 S2 S2 S2 S2 S2 S2
S2 S2 S2 S2 S2 S2 00 CS

SN: Serial number
WW: Week of Manufacture
YY: Year of Manufacture
S2: ASCII Serial Number
CS: Check Sum

-- EDID DATA DUMP TEXT --
Manufacturer Code: MEL
Product Code (HEX): 4631
Product Code (DEC): 17969
(Microsoft INF ID: MEL4631)
Serial Number (HEX): SN
Week of Manuf: WW
Year of Manuf: YY

EDID Version: 1
EDID Revision: 3
Extension Flag: 0

Video:
- Input Signal: ANALOG
- Setup: NO
- Sync on Green: NO
- Composite Sync: YES
- Separate Sync: YES
- V Sync Serration: NO
- V Signal Level: 0.700V/0.300V (1V p-p)

Max Image Size H: 40 cm
Max Image Size V: 30 cm
DPMS Stand By: YES
DPMS Suspend: YES
DPMS Active Off: YES
GTF Support: YES
Standard Default Color Space: NO
Preferred Timing Mode: YES
Display Type: RGB Color

Color:
- Gamma: 2.20
- Red x: 0.627
- Red y: 0.341
- Green x: 0.292
- Green y: 0.605
- Blue x: 0.149
- Blue y: 0.072
- White x: 0.283
- White y: 0.297

Established Timings:
- 720x400 @ 70 Hz
- 720x400 @ 88 Hz
- 640x480 @ 60 Hz
- 640x480 @ 67 Hz
- 640x480 @ 72 Hz
- 640x480 @ 75 Hz
- 800x600 @ 56 Hz
- 800x600 @ 60 Hz
- 800x600 @ 72 Hz
- 800x600 @ 75 Hz
- 832x624 @ 75 Hz
- 1024x768 @ 60 Hz
- 1024x768 @ 70 Hz
- 1024x768 @ 75 Hz
- 1152x870 @ 75 Hz
- 1280x1024 @ 75 Hz

Standard Timing #1:
- Horizontal Active Pixels: 640
- Aspect Ratio: 4:3
- (480 active lines)
- Refresh Rate: 85 Hz

Standard Timing #2:
- Horizontal Active Pixels: 800
- Aspect Ratio: 4:3
- (600 active lines)
- Refresh Rate: 85 Hz

Standard Timing #3:
- Horizontal Active Pixels: 1024
- Aspect Ratio: 4:3
- (768 active lines)
- Refresh Rate: 85 Hz

Standard Timing #4:
- Horizontal Active Pixels: 1152
- Aspect Ratio: 4:3
- (864 active lines)
- Refresh Rate: 75 Hz

Standard Timing #5:
- Horizontal Active Pixels: 1280
- Aspect Ratio: 5:4
- (1024 active lines)
- Refresh Rate: 85 Hz

Standard Timing #6:
- Horizontal Active Pixels: 1600
- Aspect Ratio: 4:3
- (1200 active lines)
- Refresh Rate: 75 Hz

Standard Timing #7:
- Horizontal Active Pixels: 1792
- Aspect Ratio: 4:3
- (1344 active lines)
- Refresh Rate: 75 Hz

Standard Timing #8:
- Horizontal Active Pixels: 1920
- Aspect Ratio: 4:3
- (1440 active lines)
- Refresh Rate: 75 Hz

Detailed Timing (block #1):
---Preferred Timing Mode---
- Pixel Clock: 229.50 MHz
- Horizontal Active: 1600 pixels
- Horizontal Blanking: 560 pixels
- Vertical Active: 1200 lines
- Vertical Blanking: 50 lines
- (Horizontal Frequency: 106.25 kHz)
- (Vertical Frequency: 85.0 Hz)
- Horizontal Sync Offset: 64 pixels
- Horizontal Sync Width: 192 pixels
- Vertical Sync Offset: 1 lines
- Vertical Sync Width: 3 lines
- Horizontal Border: 0 pixels
- Vertical Border: 0 lines
- Horizontal Image Size: 396 mm
- Vertical Image Size: 297 mm
- Interlaced: NO
- Image: Normal Display
- Sync: Digital Separate
- Bit 1: ON
- Bit 2: ON

Monitor Range Limits (block #2):
- Minimum Vertical Rate: 50 Hz
- Maximum Vertical Rate: 160 Hz
- Minimum Horizontal Rate: 30 kHz
- Maximum Horizontal Rate: 115 kHz
- Maximum Pixel Clock: 330 MHz
- GTF Data: 00 0a 20 20 20 20 20 20

Monitor Name (block #3):
DPlus 230SB

Monitor Serial Number (block #4): S2

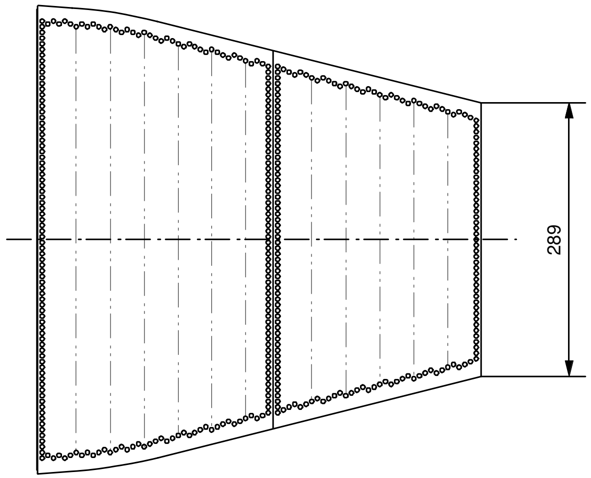
SN: Serial number
WW: Week of Manufacture
YY: Year of Manufacture
S2: ASCII Serial Number

EDID EDITOR V1.45 (010514) Copyright (C) Mitsubishi Electric 1995-2000

Electric 1995-2000

CABINET COLOR

	COLOR Ver.	MODEL NAME	Front	Other
EUROPE (NMD-E)	White Ver.	C22BW701-BM	Dark Aluminum Silver	Light Gray
	Black Ver.	C22BW701-BMBK	Dark Aluminum Silver	Dark Roof Gray
CHINA (AP)	White Ver.	C22BW701-CM	Dark Aluminum Silver	Light Gray



TILT / SWIVEL BASE
Swivel Angle : +90° ~ -90°
Tilt Angle : +10° ~ -5°

WEIGHT
APPROX 29.6kg

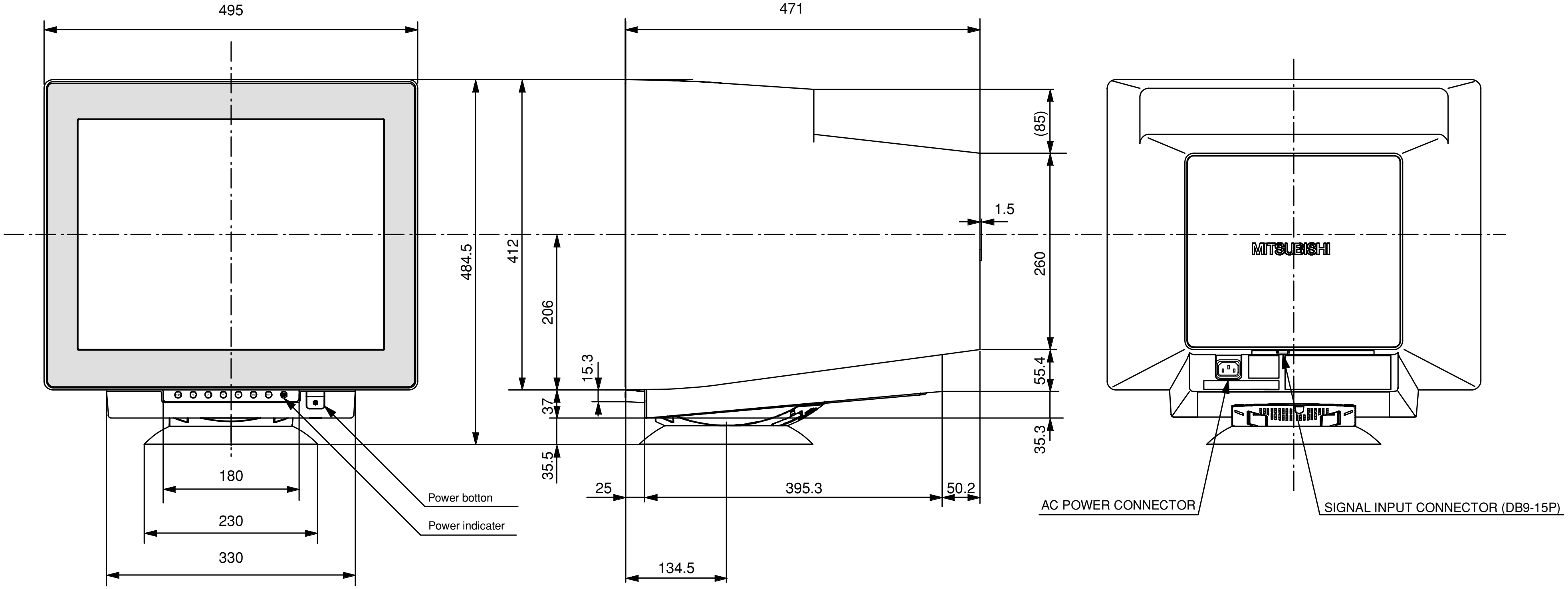


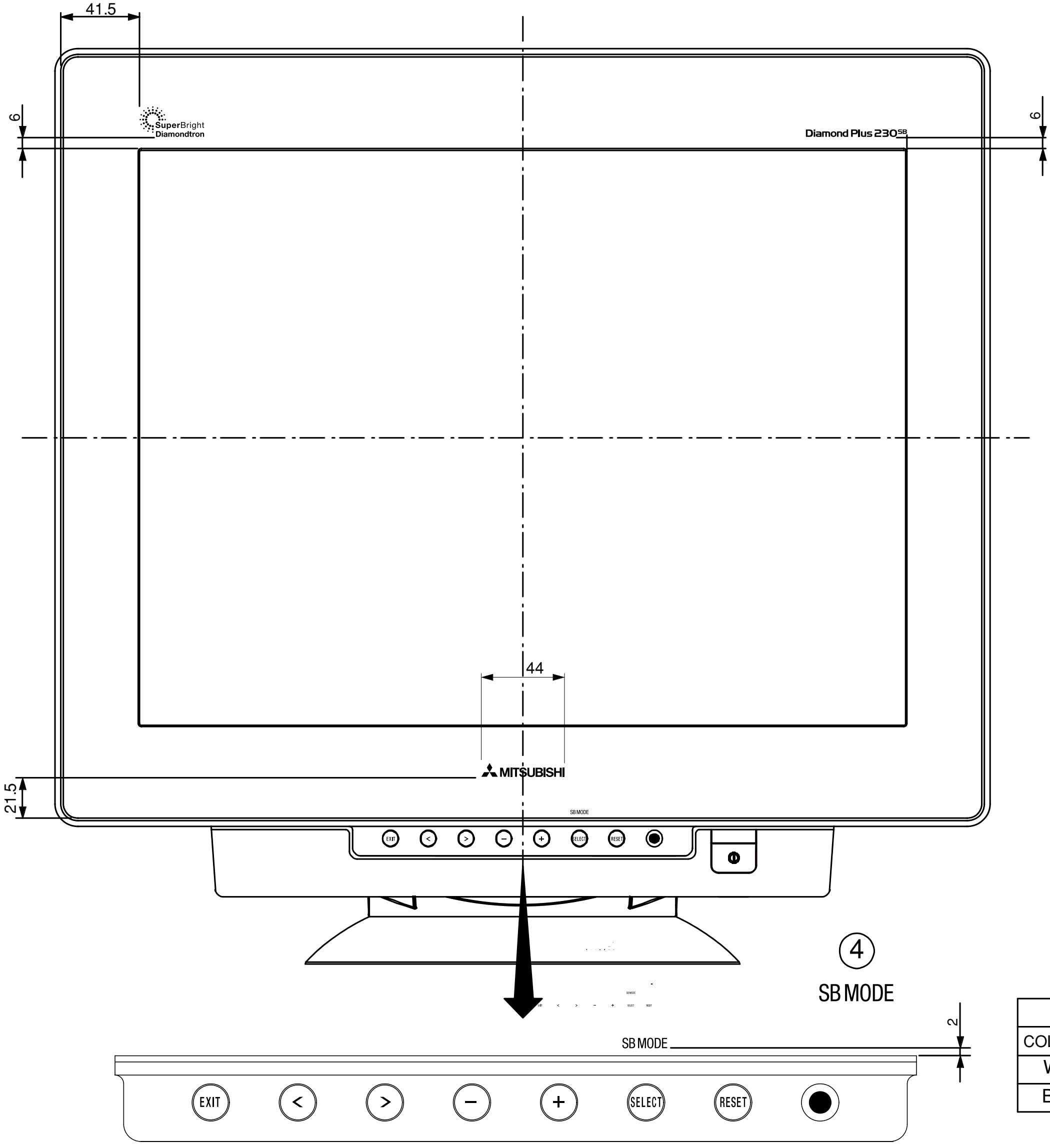
Fig. 1 OUTLINE

VSP-C0486

② SuperBright Diamondtron

③ Diamond Plus 230SB

① MITSUBISHI



④ SB MODE

COLOR Ver.	Cabinet Color		①②③④ Silk Print color
	Front	Other	
White	Dark Aluminum Silver	Light Gray	Real Gray Silver
Black	Dark Aluminum Silver	Dark Roof Gray	Real Gray Silver

Fig. 2 BEZEL LOGO

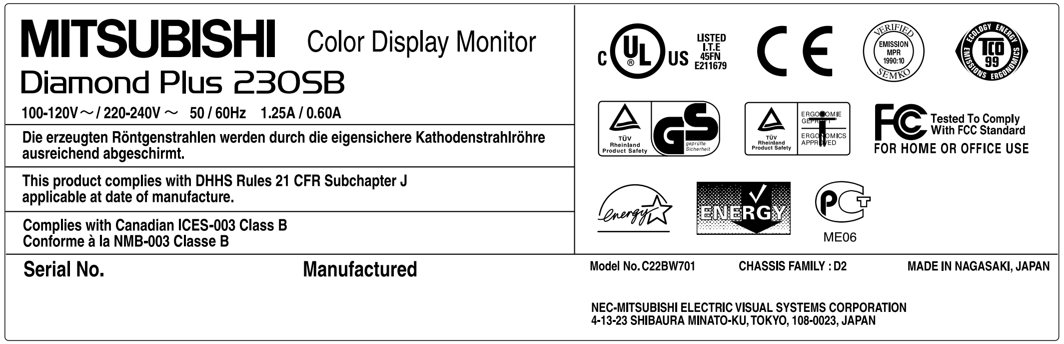
VSP-C0486

White Ver.•••C22BW701-BM

LABE SIZE •••• (W) 139.5mm X (H) 44.5mm

COLOR OF BACKGROUND •••• Gray

COLOR OF LETTERING ••••• Black



Black Ver.•••C22BW701-BMBK

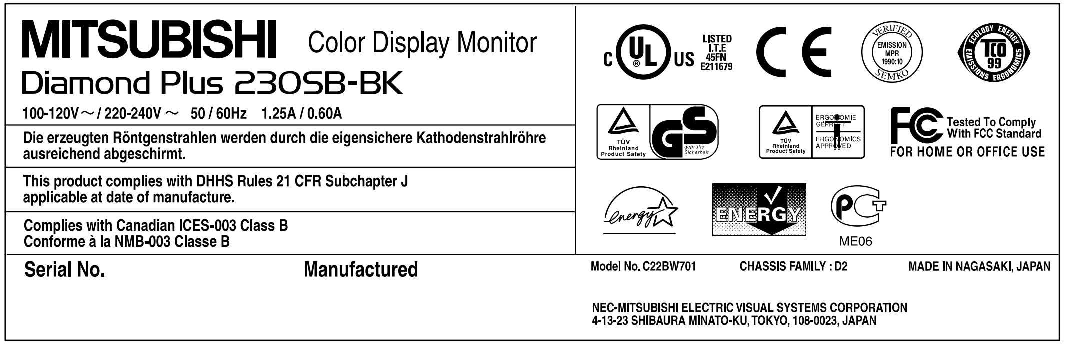


Fig.3 - 1 RATING LABEL (Europe)

LABE SIZE •••• (W) 139.5mm X (H) 44.5mm

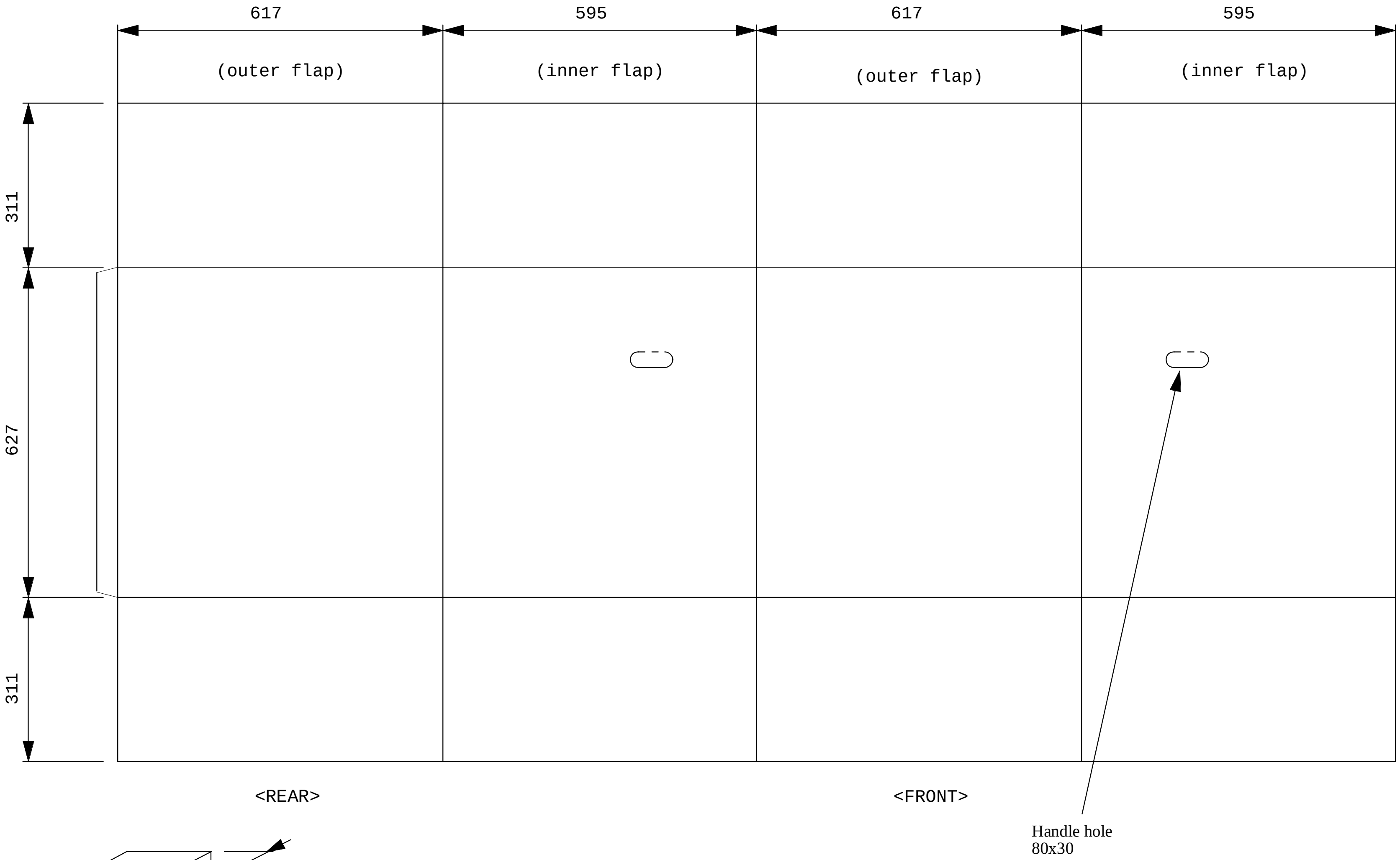
COLOR OF BACKGROUND •••• Gray

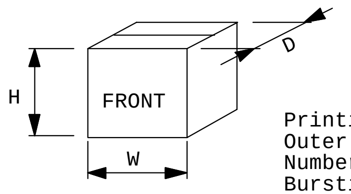
COLOR OF LETTERING ••••• Black

White Ver.•••C22BW701-CM

T.B.D

Fig.3 - 2 RATING LABEL (China)



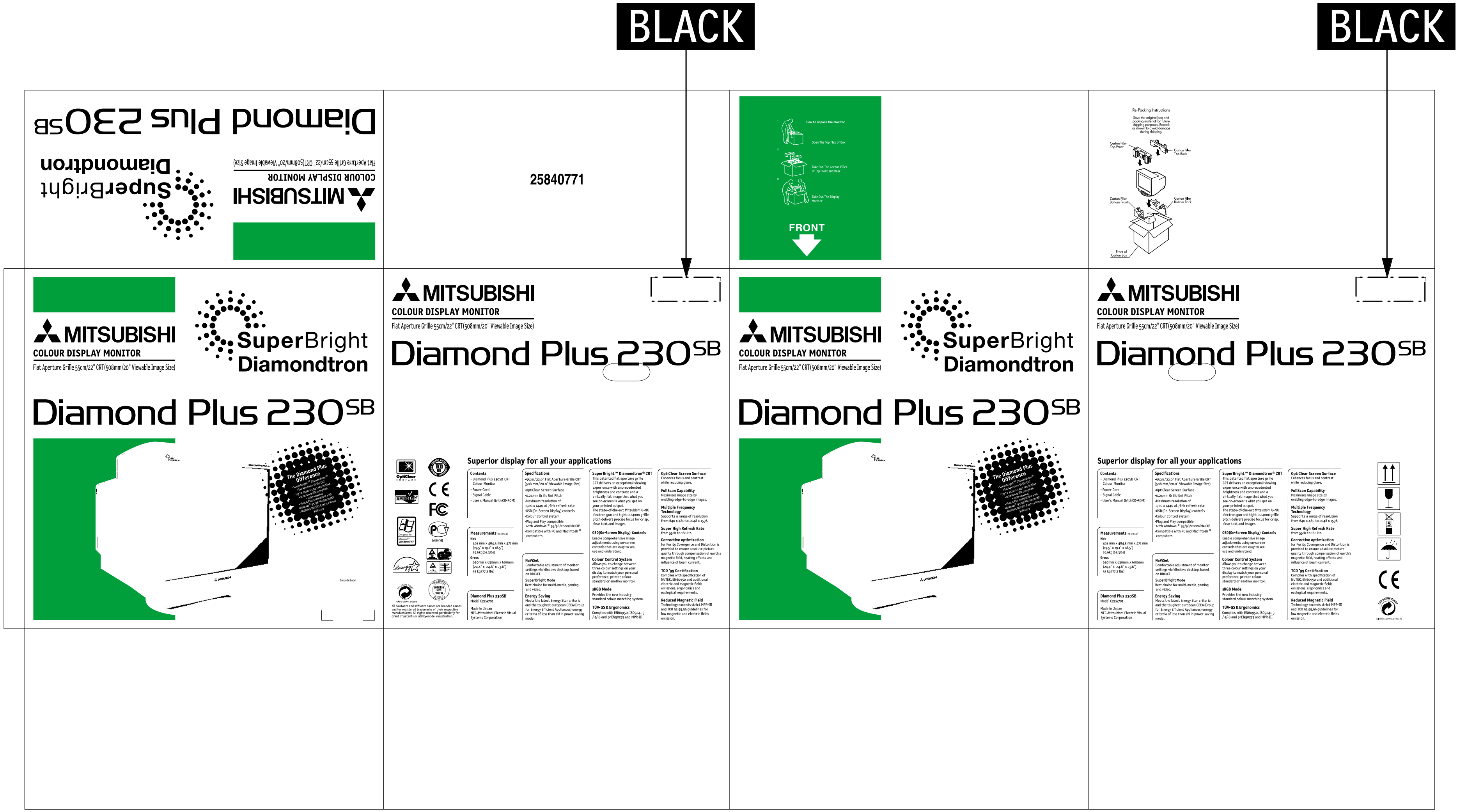


Printing process.	:	FLEXO-PRINTING
Outer dimension.	:	W:620 x H:630 x D:600 (mm)
Number of piles.	:	Max. 6 piles.
Bursting strength.	:	275LBS / inch^2
Material.	:	Kraft color linerboard and trifaced corrugated board. (Double wall)
Printing color	:	Black

Fig.4 CARTON BOX

VSP-C0486

Black Ver.•••C22BW701-BMBK



BACK LEFT FRONT RIGHT

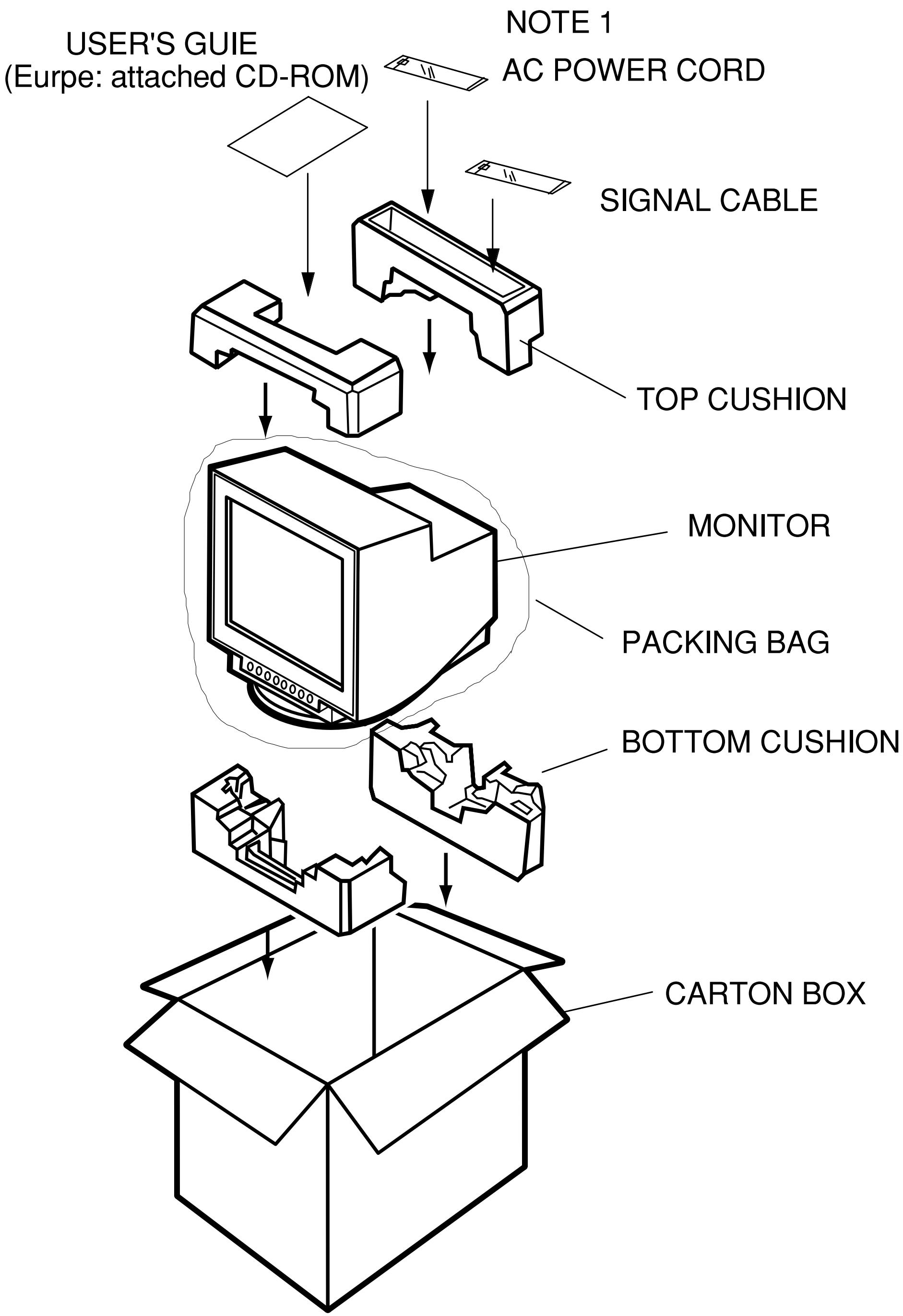
Fig.5-1 PRINTING SPECIFICATION OF CARTON BOX (Europe)

VSP-C0486

T.B.D

Fig.5-2 PRINTING SPECIFICATION OF CARTON BOX (China)

VSP-C0486



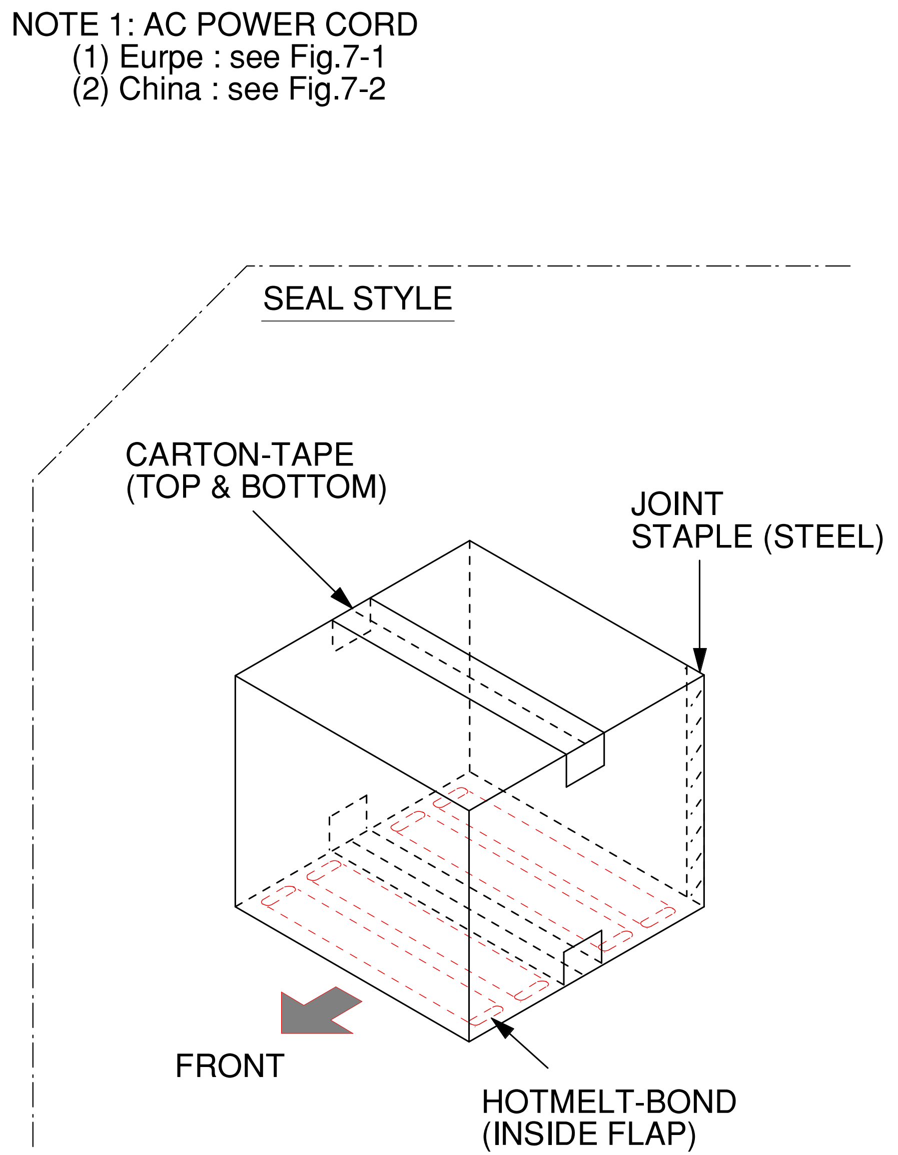


Fig.6 PACKING STYLE

VSP-C0486

<SPECIFICATION>

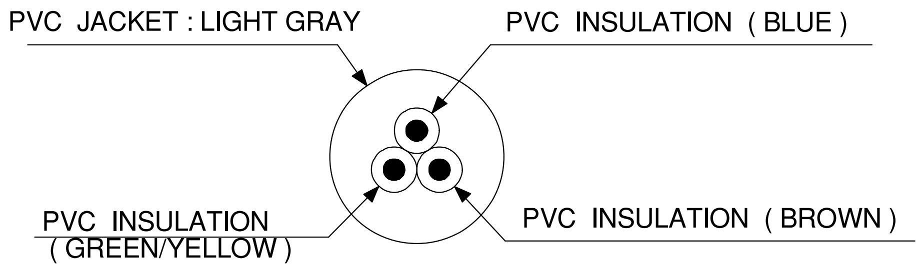
1.CABLE : Cross - section Area----1.0mm^2 X3C

2.JACKET : PVC

3.ABILITY

(1) VOLTAGE : AC 250V
(2) AMPERAGE :AC 10A
(3) TEMPERATURE :70°C

4.REGULATORY APPROVALS:VDE,KEMA-MEUK,SEMKO,NEMKO,DEMKO, FIMKO,SEV,ÖVE,IEMMEQU,CEBEC,IEC227



CONSTRUCTION

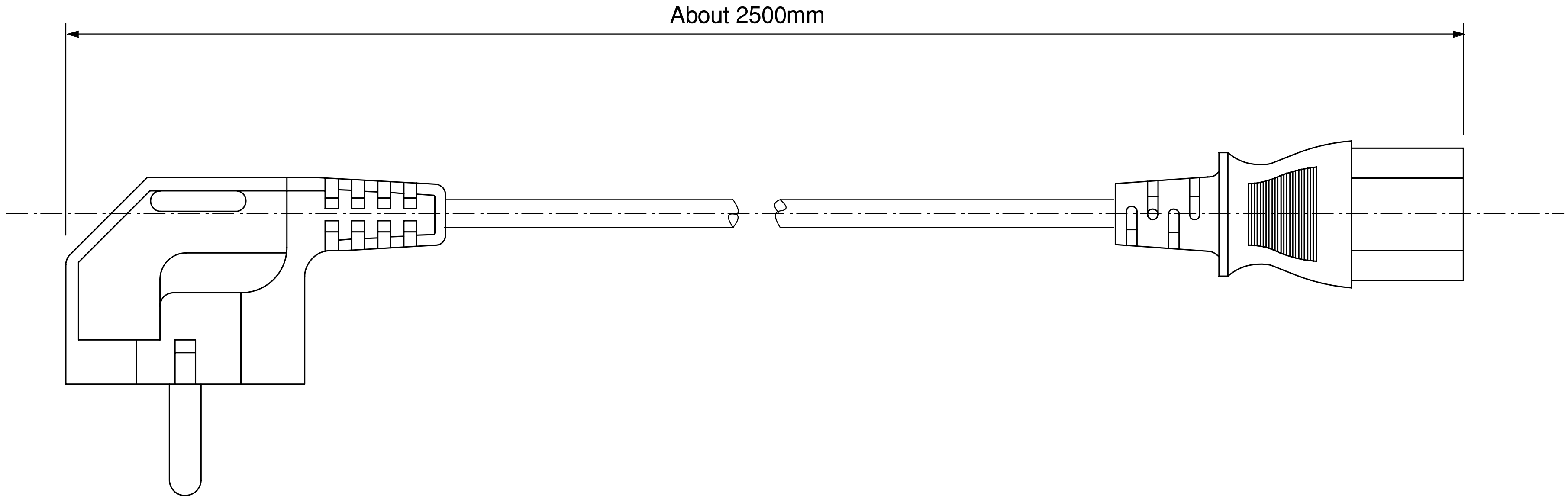


Fig. 7 - 1 AC POWER CORD (For EU)

VSP-C0486

<SPECIFICATION>

1.CABLE : Cross - section Area---1.0mm^2 X3C

2.JACKET : PVC (LIGHT GRAY)

3.ABILITY

(1) VOLTAGE : AC 250V
(2) AMPERAGE : AC 10A
(3) TEMPERATURE : 60°C

4.REGULATORY APPROVALS : GB5023.5,GB2099.1,GB1002,ZBK32003

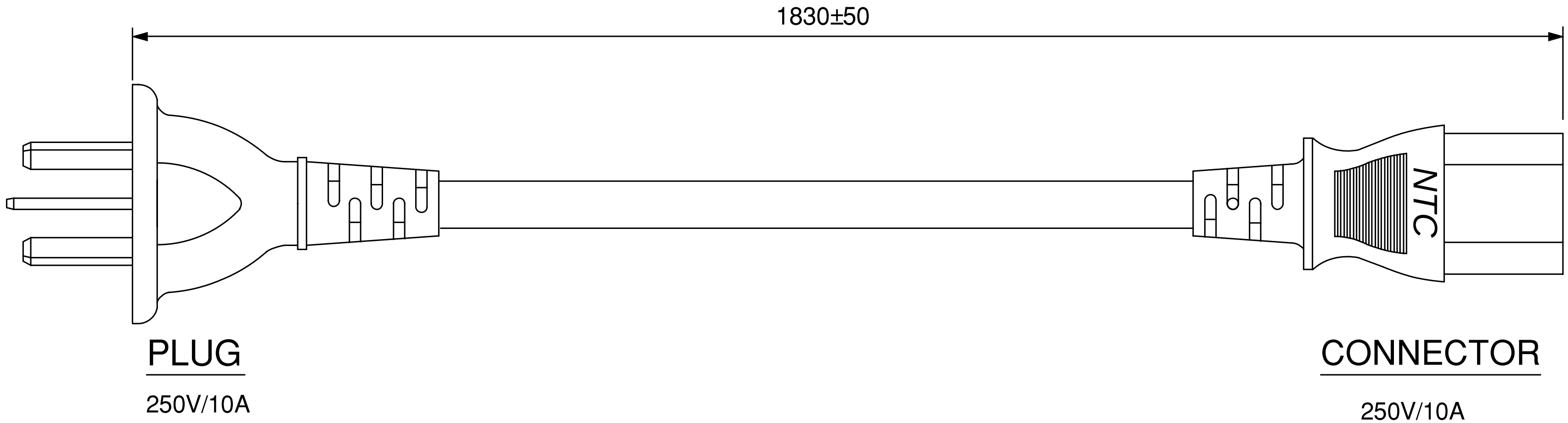


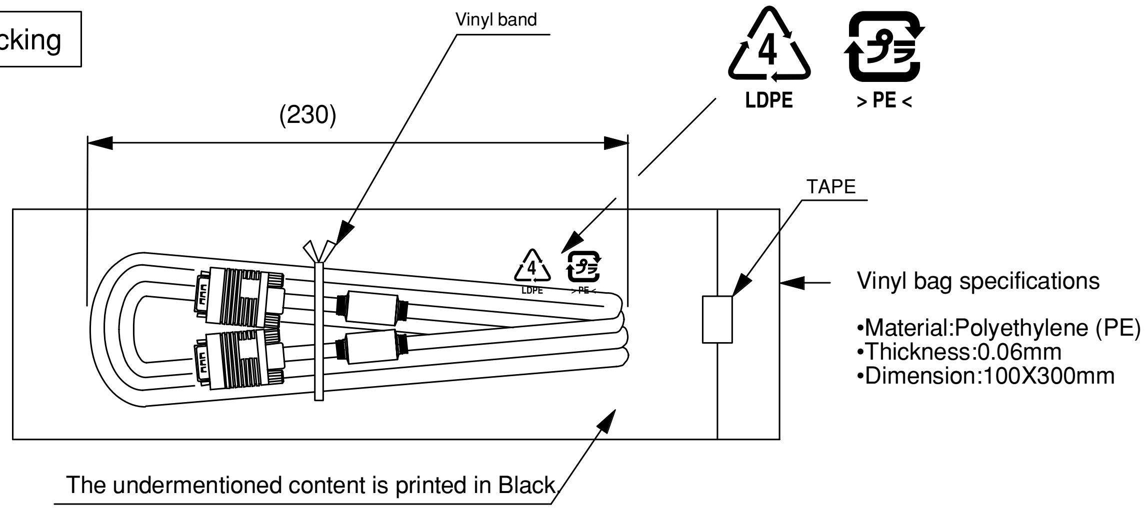
Fig. 7 - 2 AC POWER CORD (For China)

VSP-C0486

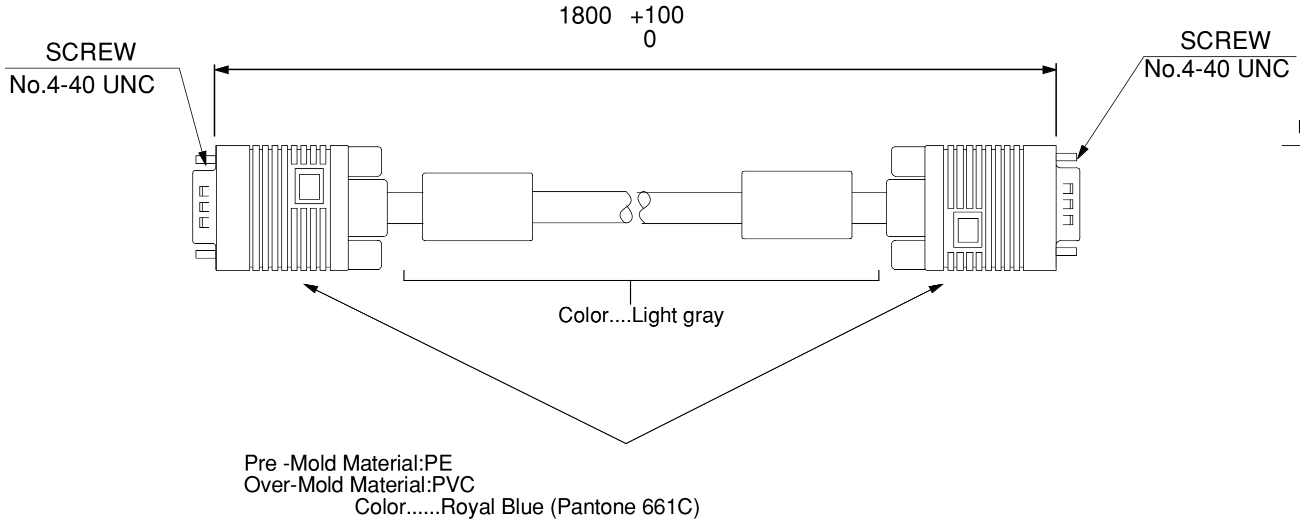
<SPECIFICATION>

1. JACKET:PVC (Color......Light gray)
2. ABILITY
   (1)VOLTAGE:30V
   (2)TEMPERATURE:80 C°

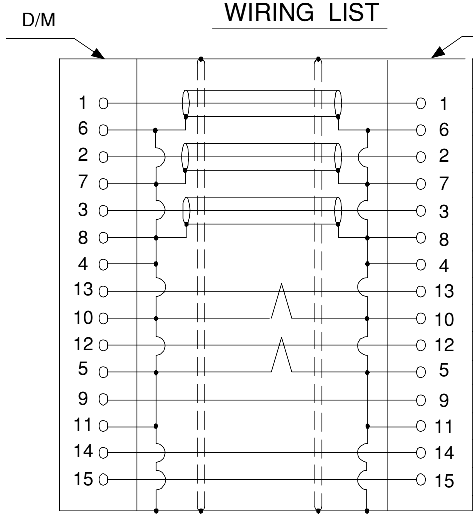
Packing



NEC-MITSUBISHI ELECTRIC VISUAL SYSTEMS CORPORATION S C - B 1 1 0



WIRING LIST



D/M	P/C	SIGNAL
1	1	Red - video
6	6	Red Gnd
2	2	Green - video or Composite sync with Green video
7	7	Green Gnd
3	3	Blue - video
8	8	Blue Gnd
4	4	Gnd
13	13	H - sync or Composite sync
10	10	Sync Gnd
12	12	Serial data
5	5	DDC Gnd
9	9	———
11	11	Gnd
14	14	V - sync (V-clock)
15	15	Serial clock

Fig. 8 SIGNAL CABLE

VSP-C0486

MITSUBISHI

User's Manual



Diamond Plus 230SB

www.nec-mitsubishi.com

Index

Declaration

Declaration of the Manufacturer

We hereby certify that the colour monitor Diamond Plus 230^{SB} is in compliance with

Council Directive 73/23/EEC:
- EN 60950

Council Directive 89/336/EEC:
- EN 55022
- EN 61000-3-2
- EN 61000-3-3
- EN 55024

and marked with

NEC-Mitsubishi Electric Visual
Systems Corporation
4-13-23, Shibaura,
Minato-Ku
Tokyo 108-0023, JAPAN

VCCI Statement

この装置は、情報処理装置等電波障害自主規制協議会(VCCI)の基準に基づくクラスB情報技術装置です。 この装置は、 家庭環境で使用することを目的としていますが、 この装置がラジオやテレビジョン受信機に近接して使用されると、 受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをしてください。

Safety Instruction

WARNING

TO PREVENT FIRE OR SHOCK HAZARDS, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE. ALSO, DO NOT USE THIS UNIT'S POLARIZED PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLETS UNLESS THE PRONGS CAN BE FULLY INSERTED.

REFRAIN FROM OPENING THE CABINET AS THERE ARE HIGH VOLTAGE COMPONENTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

CAUTION

RISK OF ELECTRIC SHOCK • DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol warns user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any part inside this unit.

This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

Canadian Department of Communications Compliance Statement

DOC: This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

C-UL: Bears the C-UL Mark and is in compliance with Canadian Safety Regulations according to CSA C22.2 #950.

FCC Information

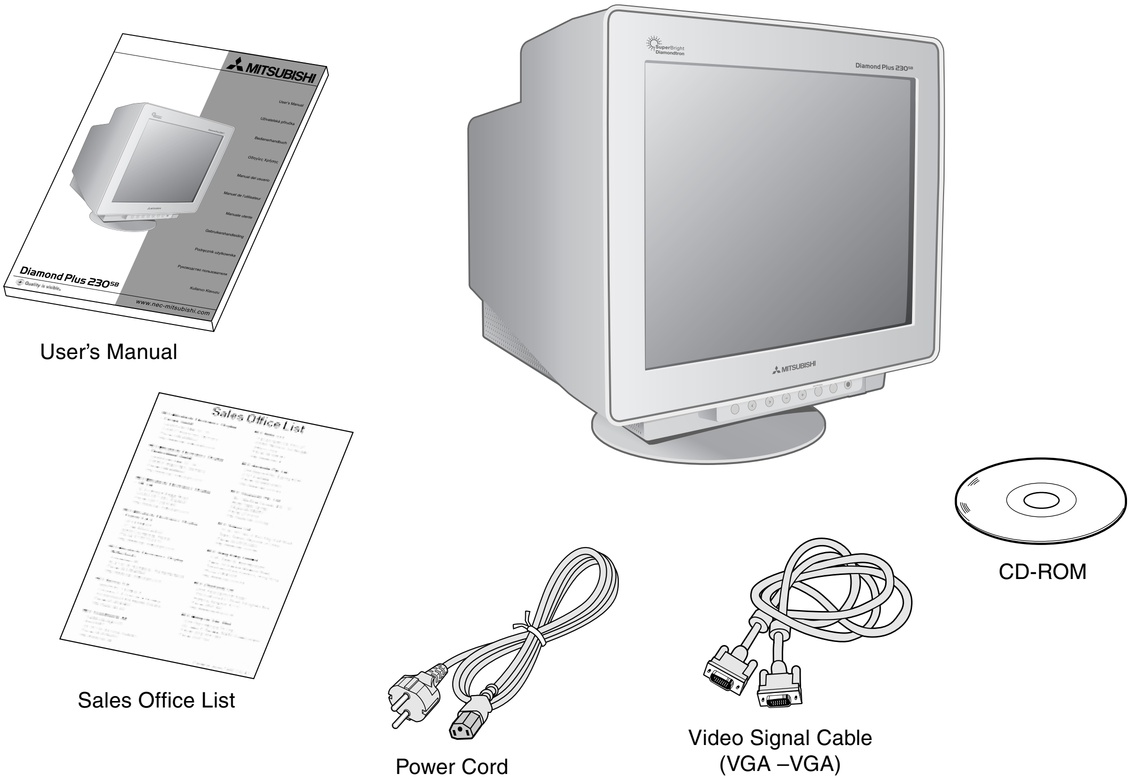
1. Use the attached specified cables with the Diamond Plus 230^{SB} colour monitor so as not to interfere with radio and television reception.
   (1) Please use the supplied power cable or equivalent to ensure FCC compliance.
   (2) Shielded video type signal cable.
   Use of other cables and adapters may cause interference with radio and television reception.
2. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
   - Reorient or relocate the receiving antenna.
   - Increase the separation between the equipment and receiver.
   - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
   - Consult your dealer or an experienced radio/TV technician for help.

If necessary, the user should contact the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet, prepared by the Federal Communications Commission, helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.
No user serviceable parts inside. Do not attempt to modify this equipment. If modified, your authority to operate this equipment might be voided by FCC.

Contents

Your new Diamond Plus 230^{SB} monitor box* should contain the following:

- Diamond Plus 230^{SB} Monitor with tilt/swivel base
- Power cord
- Video Signal Cable (VGA - VGA)
- User's Manual
- Sales Office List
- CD-ROM:
  Includes complete User's Manual in PDF format and Windows related files (INF file and colour profile). To see the complete User's Manual, Acrobat Reader 4.0 must be installed at your PC.



* Remember to save your original box and packing material to transport or ship the monitor.

Quick Start

To attach the Diamond Plus 230^{SB} monitor to your system, follow these instructions:

1. Turn off the power to your computer.
2. If necessary, install the display card into your system. For more information, refer to the display card manual.
3. **For the PC:** Connect one end of the signal cable to the connector of the display card in your system (**Figure A.1**). Tighten all screws.

   For the Mac: Connect the Macintosh cable adapter (not included) to the computer (**Figure B.1**). Attach one end of the signal cable to the Macintosh cable adapter (**Figure B.1**).

   NOTE: Some Macintosh systems do not require a Macintosh cable adapter.
4. Connect the other end of signal cable connector on the back of the monitor.

   NOTE: Incorrect cable connections may result in irregular operation, damage display quality/components of CRT monitor.
5. The Windows® 95/98/2000/Me/XP INF file for your monitor can be found on the CD-ROM, delivered with the monitor.
6. Connect one end of the power cord to the AC inlet on the back of the monitor and the other end to the power outlet (**Figure C.1**).
7. Turn on the monitor (**Figure D.1**).
8. Turn on the Computer.

   NOTE: If you have any problems, please refer to the **Troubleshooting** section of this User's Manual.

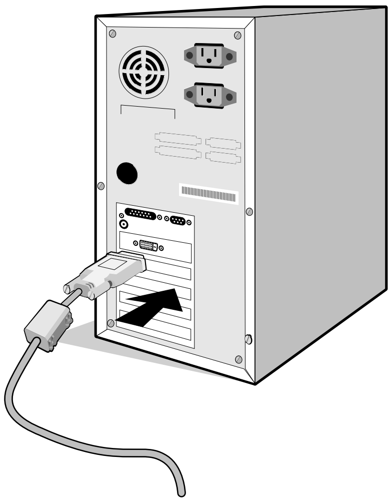


Figure A.1

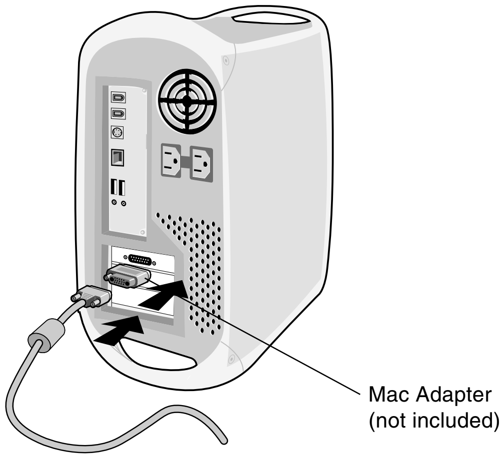


Figure B.1

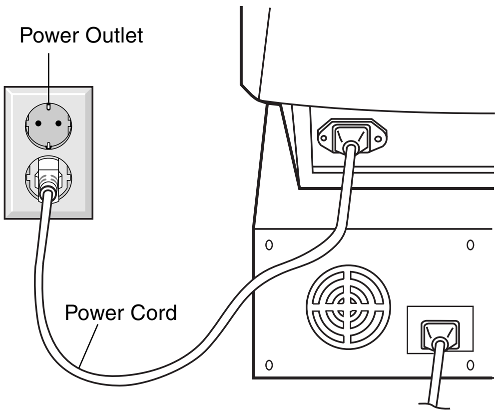


Figure C.1



Figure D.1

Controls

OSM (On-Screen Manager) control buttons on the front of the monitor function as follows:

	Main Menu	Sub-Menu
EXIT	Exits the OSM menu.	Exits to the OSM controls main menu.
	NOTE: Deactivates the OSM menu and activates the OSM menu when the OSM is turned off.	
CONTROL ◀ / ▶	Moves the highlighted area left/right to select one of the sub-menu.	Moves the highlighted area left/right to select one of the controls.
	NOTE: When the OSM menu is off, it acts as a Hot key for Brightness.	
CONTROL -/+	Has no function.	Moves the bar in the – or + direction to decrease or increase the adjustment.
	NOTE: Deactivates the OSM menu and to adjust Contrast with Hot key set "ON"	
SELECT/ SB MODE	Enters sub-menu.	Has no function.

When the OSM is off, it will act as the SuperBright (SB) function key. User can select between SB MODE OFF, SB MODE1, and SB MODE2. The first time this key is pressed, the current SB Mode is indicated. Within a 3 second window, if this key is selected again, the SB MODE will change to the next SB MODE. For example, the current mode is SB MODE OFF, the key is pressed twice within a 3 second time frame, the SB MODE will change to SB MODE1 and so on. The colour temperature at each SB Mode is adjusted by appropriate colour control except for the sRGB mode whose colour setting cannot be adjusted. When the unit is turned off, it will reset to SB off mode.

Super Bright Mode OFF: for text based images (normal use)
Super Bright Mode-1 ON: for images
Super bright Mode-2 ON: for moving image such as DVD movies

RESET	Resets all the controls within the highlighted menu to the factory setting.	Resets the highlighted control to the factory setting.
	NOTE: When RESET is pressed in the main and sub-menu, a warning window will appear allowing you to select the reset function.	

☼◑ Brightness/Contrast Controls

Brightness: Adjusts the overall image and background screen brightness.

Contrast: Adjusts the image brightness in relation to the background.

Degauss: Eliminates the build-up of stray magnetic fields which alter the correct scan of the electron beams and affect the purity of the screen colours, focus, and convergence. When activated, your screen image will jump and waver a bit as the screen is demagnetised.

NOTE: Please allow a minimum of 20 minutes to elapse between uses of the Degauss function.

Constant Brightness: Sustains the brightness and screen colour levels consistently over the normal life of the monitor. The **Constant Brightness** function requires a 30 minute warm-up of the monitor before the feature is fully functional.

Size and Position Controls

AutoAdjust: Automatically adjust the horizontal and vertical size and position settings for applicable timings.

NOTE: AutoAdjust is unavailable with no image signal or narrow size of image signal input.

Left/Right: Moves the image horizontally (left or right).

Down/Up: Moves the image vertically (up or down).

Narrow/Wide: Decreases or increases the horizontal size of the image.

Short/Tall: Decreases or increases the vertical size of the image.

Colour Control/Colour Control System

Colour presets 1 through 5 selects the desired colour setting. The bar is replaced by the colour setting choice from 1, 2, 3, sRGB, 5. Each colour setting is adjusted at the factory to the stated Kelvin. If a setting is adjusted, the name of the setting will change from Kelvin to Custom.

NOTE: sRGB does not allow you to adjust each colour.

Red, Green, Blue: Colour Control System decreases or increases the monitor's red, green or blue colour guns depending upon which is selected. The change in colour will appear on screen and the direction (decrease or increase) will be shown by the bars.

sRGB Mode: sRGB mode provides the suitable colour managed picture image. You can not change Red, Green and Blue colours individually.

NOTE: In this mode Colour Control, Brightness and Contrast are not adjustable.

Geometry Controls

Geometry Controls Menu

The **Geometry** controls allow you to adjust the curvature or angle of the sides of your display.

In/Out (pincushion): Decreases or increases the curvature of the sides either inward or outward.

Left/Right (pincushion balance): Decreases or increases the curvature of the sides either to the left or right.

Tilt (parallelogram): Decreases or increases the tilt of the sides either to the left or right.

Align (trapezoidal): Decreases or increases the bottom of the screen to be the same as the top.

Rotate (raster rotation): Rotates the entire display clockwise or counterclockwise.

Corner Correction: Allows you to adjust the geometry of the corners of your display – Top, Top Balance, Bottom or Bottom Balance.

Tools 1

Moiré Canceler: Moiré is a wavy pattern which can sometimes appear on the screen. The pattern is repetitive and superimposed as rippled images. When running certain applications, the wavy pattern is more evident than in others. To reduce moiré, adjust the level by using -/+control buttons.

Basic Convergence: Aligns all three colours (R,G,B) to form a single colour (white). The purpose of this control is to ensure that a white line drawn on the screen is as crisp and clear as possible.

- Use the CONVERGENCE (HOR.) to adjust the alignment of the white lines in the left/right direction.
- Use the CONVERGENCE (VER.) to adjust the alignment of the white lines in the up/down direction.

Linearity: This selection allows you to adjust the spacing of the area on the screen. The purpose of this control is to ensure that a one-inch circle is a true one-inch circle wherever it is on the screen. The best way to determine the vertical linearity is as follows:

- Draw equally spaced horizontal lines using a drawing application that has a ruler.
- Use the Vertical Balance control to adjust the lines near the top and bottom of your screen.
- Use the LINEARITY (VER.) to adjust the spacing between the lines near the centre and top of your screen.

GlobalSync Control: Eliminates picture impurities that may result from the earth's magnetic field. While in the sub-menus (GLOBALSYNC, TOP LEFT, TOP RIGHT, BOTTOM LEFT or BOTTOM RIGHT), use the –/+ control buttons to fine tune the GlobalSync corrections.

NOTE: Mitsubishi recommends that you perform GlobalSync correction while running a typical application such as a spreadsheet or text document.

Tools 2

Language: OSM controls menus are available in six languages.

OSM Position: You can choose where you would like the OSM controls menu to appear on your screen. Selecting OSM Position allows you to manually adjust the OSM controls menu left, right, up or down.

OSM Turn Off: The OSM controls menu will stay on as long as it is in use. In the OSM Turn Off sub-menu, you can select how long the monitor waits after the last touch of a button for the OSM controls menu to disappear. The preset choice is in 5 seconds step between 5–120 seconds.

OSM Lock Out: This control completely locks out access to all OSM controls functions except Brightness and Contrast. When attempting to activate OSM controls while in the lock out mode, a screen will appear indicating that OSM controls are locked out. To activate the OSM Lock Out function, press SELECT, then press + and hold down simultaneously. To deactivate the OSM Lock Out, press SELECT, then press + and hold down simultaneously.

IPM System Off Mode:

Enable: The IPM System works normally and all stages of energy savings are utilised.
Disable: The Off Mode of the IPM System is not used.

NOTE: For standard systems and graphics boards, keep the factory setting at ENABLE.

NOTE: Don’t keep the monitor on when ‘No Signal’ is applied. This could cause image burn in on the screen due to the ‘No Signal’ message being displayed.

EdgeLock Control: Operating your monitor at a non-standard timing may cause images to appear darker than normal or have colour distortion. Use of the EdgeLock control will adjust images to their normal state.

Hot Key: This selection allows you to use ◄ / ► as brightness control and –/+ as contrast control.

Factory Preset: Selecting Factory Preset allows you a reset most OSM control settings back to the factory settings. A warning statement will appear to confirm that you do want to reset ALL settings. Individual settings can be reset by highlighting the control to be reset and pressing the **RESET** button.

Information

Display Mode: Indicates the current mode and frequency setting of the monitor.

Monitor Info: Indicates the model and serial numbers of your monitor.

Refresh Notifier: A message will advise you if the refresh rate of the signal being applied to the monitor by the computer is too low. For further information, please refer to your display card or system manual.

Recommended use

Safety Precautions and Maintenance

FOR OPTIMUM PERFORMANCE, PLEASE NOTE THE FOLLOWING WHEN SETTING UP AND USING THE DIAMOND PLUS 230^{SB} COLOUR MONITOR:

- **DO NOT OPEN THE MONITOR.** There are no user serviceable parts inside and opening or removing covers may expose you to dangerous shock hazards or other risks. Refer all servicing to qualified service personnel.
- Do not spill any liquids into the cabinet or use your monitor near water.
- Do not insert objects of any kind into the cabinet slots, as they may touch dangerous voltage points,which can be harmful or fatal or may cause electric shock,fire or equipment failure.
- Do not place any heavy objects on the power cord. Damage to the cord may cause shock or fire.
- Do not place this product on a sloping or unstable cart, stand or table, as the monitor may fall, causing serious damage to the monitor.
- Keep the monitor away from high capacity transformers, electric motors and other devices such as external speakers or fans, which may create strong magnetic fields.
- If possible, position the monitor so that it is facing the east to minimise the effects of the earth's magnetic field.
- Changing the direction of the monitor while it is powered on may cause image discolouration. To correct this, turn the monitor off for 20 minutes before powering it back on.
- When operating the Diamond Plus 230^{SB} with its AC 100-120/220-240V worldwide power supply, use a power supply cord that matches the power supply voltage of the AC power outlet being used. The power supply cord you use must have been approved by and comply with the safety standards of your country. (Type H05VV-F 3G 0.7 mm^2 should be used in Europe)
- In UK, use a BS-approved power cord with molded plug having a black (5A) fuse installed for use with this monitor. If a power cord is not supplied with this monitor, please contact your supplier.

Immediately unplug your monitor from the wall outlet and refer servicing to qualified service personnel under the following conditions:

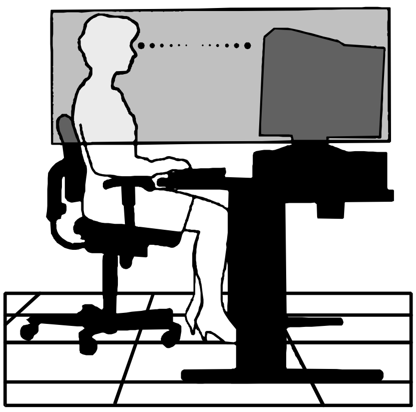
- When the power supply cord or plug is damaged.
- If liquid has been spilled, or objects have fallen into the monitor.
- If the monitor has been exposed to rain or water.
- If the monitor has been dropped or the cabinet damaged.
- If the monitor does not operate normally by following operating instructions.

CAUTION

- Allow adequate ventilation around the monitor so that heat can properly dissipate. Do not block ventilated openings or place the monitor near a radiator or other heat sources. Do not put anything on top of monitor.
- The power cable connector is the primary means of detaching the system from the power supply. The monitor should be installed close to a power outlet which is easily accessible.
- Handle with care when transporting. Save packaging for transporting.

CORRECT PLACEMENT AND ADJUSTMENT OF THE MONITOR CAN REDUCE EYE, SHOULDER AND NECK FATIGUE. CHECK THE FOLLOWING WHEN YOU POSITION THE MONITOR:

- Adjust the monitor height so that the top of the screen is at or slightly below eye level. Your eyes should look slightly downward when viewing the middle of the screen.
- Position your monitor no closer than 40 cm and no further away than 70 cm from your eyes. The optimal distance is 60 cm.
- Rest your eyes periodically by focusing on an object at least 6 m away. Blink often.
- Position the monitor at a 90° angle to windows and other light sources to minimise glare and reflections. Adjust the monitor tilt so that ceiling lights do not reflect on your screen.
- If reflected light makes it hard for you to see your screen, use an anti-glare filter.



- Clean your monitor

  A special coating is provided on the glass (CRT) surface of this monitor to reduce a reflection and static electricity on the glass surface.

  Due to the delicate coating on the glass surface, use a lint-free, nonabrasive cloth (cotton or equivalent) and a non-alcohol, neutral, nonabrasive cleaning solution to minimise dust. If the screen requires more than a light cleaning, apply water or soften neutral detergent with much water directly to a soft cloth and use it upon wringing water, to clean the glass surface.

  CAUTION: The following agents will cause damage to the CRT when cleaning the glass surface: Benzene, thinner, acid/alkaline detergent, alcohol deter-gent, detergent with abrasive powder, detergent with antistatic agent, detergent for cleaning.
- Adjust the monitor's brightness and contrast controls to enhance readability.
- Use a document holder placed close to the screen.
- Position whatever you are looking at most of the time (the screen or reference material) directly in front of you to minimise turning your head while you are typing.
- Get regular eye checkups.

Ergonomics

To realise the maximum ergonomics benefits,we recommend the following:

- Adjust the Brightness until the background raster disappears
- Do not position the Contrast control to its maximum setting
- Use the preset Size and Position controls with standard signals
- Use the preset Colour Setting and Sides Left/Right controls
- Use non-interlaced signals with a vertical refresh rate between 75-160Hz
- Do not use primary colour blue on a dark background, as it is difficult to see and may produce eye fatigue due to insufficient contrast

Specifications

Monitor Specifications		Diamond Plus 230^{SB} Monitor	Notes
Picture Tube	Diagonal: Viewable Image Size:	22 inch/550 mm 20 inch/508 mm	90° deflection, 0.24 mm grille pitch, medium short persistence phosphor, aperture grille CRT, G-WARAS coating
Input Signal	Video: Sync:	ANALOG 0.7 Vp-p/75 Ohms Separate sync. TTL Level Horizontal sync. Positive/Negative Vertical sync. Positive/Negative Composite sync. (Negative) (TTL Level)	
Display Colours	Analog input:	Unlimited number of Colours	Depends on display card used.
Synchronization Range	Horizontal: Vertical:	30 kHz to 115 kHz 50 Hz to 160 Hz	Automatically Automatically
Resolutions Supported Resolution based on horizontal and vertical frequencies only		640 x 480 @ 50 to 160 Hz 800 x 600 @ 50 to 160 Hz 1024 x 768 @ 50 to 138 Hz 1280 x 1024 @ 50 to 105 Hz 1600 x 1200 @ 50 to 91 Hz .... 1800 x 1350 @ 50 to 81 Hz 1800 x 1440 @ 50 to 76 Hz 1856 x 1392 @ 50 to 79 Hz 1920 x 1440 @ 50 to 76 Hz	Some systems may not support all modes listed. NEC-Mitsubishi Electronics Display cites recommended resolution a 85 Hz for optimal display performance.
Active Display Area (Factory Setting)	Horizontal: Vertical:	396 mm/15.6 inches 297 mm/11.7 inches	Dependent upon signal timing used, and does not include border area.
Active Display Area (Full Scan)		406 mm/16.0 inches 304.6 mm/12.0 inches	Dependent upon signal timing used, and does not include border area.
Power Supply		AC 100-120 V/220-240 V, 50/60 Hz	
Current Rating		1.25A @ 100-120 V / 0.6A @ 220-240 V	
Dimensions		495 mm (W) x 484.5 mm (H) x 471 mm (D) 19.5 inches (W) x 19.1 inches (H) x 18.5 inches (D)	
Weight		29.6 kg 65.3 lbs	
Environmental Considerations	Operating Temperature: Humidity: Altitude: Storage Temperature: Humidity: Altitude:	+5°C to +35°C/+41°F to +90°F 10% to 90% 0 m (0 ft) ~ 3,000 m (10,000 ft) -20°C to +60°C/-4°F to +140°F 10% to 90% 0 m (0 ft) ~ 15,000 m (50,000 ft)	

NOTE: Technical specifications are subject to change without notice.

Features

Flat Aperture Grille CRT: Delivers an unparalleled viewing experience with a virtually flat image, eliminating distortion and reducing glare so that what you see on-screen is what you get on your printed output. The striped phosphor alignment of the CRT delivers superior vertical definition with improved bright-ness for more uniform image contrast.

OptiClear Screen Surface: Reduces reflection and glare and increases contrast without sacrificing focus level, clarity or brightness. Along with the flat square technology CRT, a high contrast screen with 0.24 mm grille pitch delivers crisp, clean text and graphics.

Dual Dynamic Beam Focus: Provides precise, continuous focus adjustments of the electron beams and optimum image quality, even to the far edges of the screen.

Colour Control System: Allows you to change between five colour settings on your display to match your personal preference.

OSM (On-Screen Manager) Controls: Allows you to quickly and easily adjust all elements of your screen image via simple to use on-screen menus.

ErgoDesign Features: Enhances human ergonomics to improve the working environment, protect the health of the user and save money. Examples include OSM controls for quick and easy image adjustments, tilt/swivel base for pre-ferred angle of vision and compliance with MPRII guidelines for lower emissions.

Plug and Play: The Microsoft® solution with the Windows® 95/98/2000/Me/XP operating system facilitates setup and installation by allowing the monitor to send its capabilities (such as screen size and resolutions supported) directly to your computer, automatically optimizing display performance.

IPM (Intelligent Power Manager) System: Provides innovative power-saving methods that allow the monitor to shift to a lower power consumption level when on but not in use, saving two-thirds of your monitor energy costs, reducing emissions and lowering the air conditioning costs of the workplace.

Reduced Magnetic Field Technology: Reduces magnetic and alternating electric field emissions and static electricity, addressing ergonomic concerns regarding potential risks from extended computer monitor use.

Multiple Frequency Technology: Automatically adjusts monitor to the display card's scanning frequency, thus displaying the resolution required.

FullScan Capability: Allows you to use the entire screen area in most resolutions, significantly expanding image size.

GlobalSync /Corner Purity Control: Mitsubishi's unique design automatically eliminates picture impurities that may result from stray magnetic fields (including the earth's permanent magnets,etc.) and now allows you to easily adjust impurities in the four corners of your monitor.

Convergence Control: Allows you to adjust the horizontal and vertical convergence ensure that a white line drawn on the screen is as crisp and clear as possible.

Auto Adjust: Allows you to easily and quickly adjust and position for Non-preset timming.

GTF Auto Adjust: Automatically adjust horizontal and vertical size and position settings according to GTF standard with the signal timing which Auto Adjust is not available.

Constant Brightness: Sustains the brightness and screen colour levels consistently over the normal life of the monitor.

SB (Super Brightness) Mode: Provides the screen brightness suitable for the screen images displayed.

Super Bright Mode OFF: for text based images (normal use)
Super Bright Mode-1 ON: for images
Super bright Mode-2 ON: for moving image such as DVD movies

Monitor Troubleshooting

No picture

- Display card should be completely seated in its slot.
- Power Button and computer power switch should be in the ON position.
- Signal cable should be completely connected to display card/computer.
- Check connector for bent or pushed-in pins.

Image is scrolling or unstable

- Signal cable should be completely attached to the computer.
- Check pin assignments and signal timings of the monitor and your display card with respect to recommended timings and pin assignments.
- If the Macintosh cable adapter is used, check for proper connection or make sure the display card is Macintosh compatible and that the card is properly seated in the computer.

LED on monitor is not lit (no green or orange colour can be seen)

- Power Switch should be in the ON position and power cord should be connected.

Picture is fuzzy or colour looks blotchy

- If the picture is fuzzy, adjust the Moiré Canceler control. If the colour looks blotchy, adjust the Brightness, Contrast or GlobalSync controls, or use the EdgeLock control to change modes.
- Access the Degauss Control through OSM controls. Activate the Degauss Control.

CAUTION: A minimum interval of 20 minutes should elapse before the Degauss Control is used a second time when not switching between modes.

Picture bounces or a wavy pattern is present in the picture

- Move electrical devices that may be causing electrical interference away from the monitor.

Edges of the display image are not square

- Use the OSM Geometry Controls to straighten the edges.
- If possible, position the front of the monitor facing east.

Display image is not centered, too small, or too large

- Use the OSM Size and Position Controls to adjust the image.

Thin horizontal lines appear on your screen

- Thin horizontal lines are normal for an aperture grille CRT and are not a malfunction. These are shadows from the damper wires used to stabilize the aperture grille and are most noticeable when the screen's background is light (usually white).

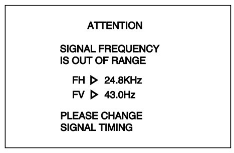
Black vertical lines are visible on the screen

- Thin vertical black lines on one or both sides of the screen. This minor condition is caused by grille element overlap which can occur during shipping.
- Position an open white window over the affected area of the screen and maximize the brightness and contrast controls. This will cause localized heating of the overlap which will clear in a few minutes. Be sure to readjust the brightness and contrast controls back to the normal viewing level after this procedure.

Attention message displayed

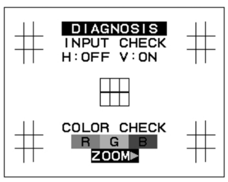
- Check the inputted signal.

NOTE: The attention message may display when power on the Diamond monitor. In case that the attention message disappear after in a little while, there is no problem at the inputted signal.



Self check function

- Press any control button on the front of monitor when you see a problem on the screen.
- In case that all R, G and B colours are seen in the diagnosis message, the Diamond monitor has no problem. In case that some colour is lack in the message, the Diamond monitor has a problem. Contact Mitsubishi Customer Service.
- In case that no diagnosis message displayed with LED lit in green, power off the computer.
- Check the signal cable and computer in case that the diagnosis message displayed.
- Contact Mitsubishi Customer Service in case that the diagnosis message still does not display.
- In case that no diagnosis message displayed with LED lit in orange.
- Check the signal cable and computer.
- Move the mouse or press any key on the keyboard.
- In case that no diagnosis message displayed with LED lit in green and orange.
- Contact Mitsubishi Customer Service.



TCO'99

Diamond Plus 230SB

Congratulations! You have just purchased a TCO'99 approved and labeled product! Your choice has provided you with a product developed for professional use. Your purchase has also contributed to reducing the burden on the environment and also to the further development of environmentally adapted electronics products.

Why do we have environmentally labelled computers?

In many countries, environmental labelling has become an established method for encouraging the adaptation of goods and services to the environment. The main problem, as far as computers and other electronics equipment are concerned, is that environmentally harmful substances are used both in the products and during the manufacturing. Since it has not been possible for the majority of electronics equipment to be recycled in a satisfactory way, most of these potentially damaging substances sooner or later enter Nature.
There are also other characteristics of a computer, such as energy consumption levels, that are important from the viewpoints of both the work (Internal) and natural (external) environments. Since all methods of conventional electricity generation have a negative effect on the environment (acidic and climate-influencing emissions, radioactive waste, etc.), it is vital to conserve energy. Electronics equipment in offices consume an enormous amount of energy since they are often left running continuously.

What does labelling involve?

This product meets the requirements for the TCO'99 scheme which provides for international and environmental labelling of personal computers. The labelling scheme was developed as a joint effort by the TCO (The Swedish Confederation of Professional Employees), Svenska Naturskyddsforeningen (The Swedish Society for Nature Conservation) and Statens Energimyndighet (The Swedish National Energy Administration).
The requirements cover a wide range of issues: environment, ergonomics, usability, emission of electrical and magnetic fields, energy consumption and electrical and fire safety.
The environmental demands concern restrictions on the presence and use of heavy metals, brominated and chlorinated flame retardants, CFCs (freons) and chlorinated solvents, among other things. The product must be prepared for recycling and the manufacturer is obliged to have an environmental plan which must be adhered to in each country where the company implements its operational policy. The energy requirements include a demand that the computer and/or display, after a certain period of inactivity, shall reduce its power consumption to a lower level in one or more stages. The length of time to reactivate the computer shall be reasonable for the user.
Labelled products must meet strict environmental demands, for example, in respect of the reduction of electric and magnetic fields, physical and visual ergonomics and good usability.

Environmental Requirements

Flame retardants

Flame retardants are present in printed circuit boards, cables, wires, casings and housings. In turn, they delay the spread of fire. Up to thirty percent of the plastic in a computer casing can consist of flame retardant substances. Most flame retardants contain bromine or chloride and these are related to another group of environmental toxins, PCBs, which are suspected to give rise to severe health effects, including reproductive damage in fisheating birds and mammals, due to the bioaccumulative* processes. Flame retardants have been found in human blood and researchers fear that disturbances in foetus development may occur.
TCO' 99 demand requires that plastic components weighing more than 25 grams must not contain flame retardants with organically bound chlorine and bromine. Flame retardants are allowed in the printed circuit boards since no substitutes are available.

Lead**

Lead can be found in picture tubes, display screens, solders and capacitors. Lead damages the nervous system and in higher doses, causes lead poisoning.
TCO' 99 requirement permits the inclusion of lead since no replacement has yet been developed.

Cadmium**

Cadmium is present in rechargeable batteries and in the colourgenerating layers of certain computer displays. Cadmium damages the nervous system and is toxic in high doses.
TCO' 99 requirement states that batteries, the colourgenerating layers of display screens and the electrical or electronics components must not contain any cadmium.

Mercury**

Mercury is sometimes found in batteries, relays and switches, Mercury damages the nervous system and is toxic in high doses.
TCO' 99 requirement states that batteries may not contain any Mercury. It also demands that no mercury is present in any of the electrical or electronics components associated with the display unit.

CFCs (freons)

CFCs (freons) are sometimes used for washing printed circuit boards. CFCs break down ozone and thereby damage the ozone layer in the stratosphere, causing increased reception on Earth of ultraviolet light with consequent increased risks of skin cancer (malignant melanoma).
The relevant TCO' 99 requirement; Neither CFCs nor HCFCs may be used during the manufacturing and assembly of the product or its packaging.

* Bio-accumulative is defined as substances which accumulate within living organisms.
** Lead, Cadmium and Mercury are heavy metals which are Bio-accumulative.

To obtain complete information on the environmental criteria document, order from:

TCO Development Unit
SE-114 94 Stockholm
SWEDEN
FAX Number: +46 8 782 92 07
E-mail (Internet): development@tco.se

You may also obtain current information on TCO' 99 approved and labelled products by visiting their website at:
http://www.tcodevelopment.com/

ALL PARTS LIST

MODEL NO.: Diamond Plus 230SB(B), Diamond Plus 230SB-BK(B) (C22BW701)

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
CAPACITOR			
C100	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C101	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C102	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C103	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C104	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C105	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C106	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C107	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C108	CAP SMD X7R/T 0.01u/50V K 0805	GM010353	79PQ1948
C110	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C111	CAP ELECT 85oC/T 100u/16V M	GA310725	79PQ0199
C112	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C113	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C114	CAP SMD Y5V/T 0.47u/50V Z 0805	GM047458	79EN0499
C115	CAP SMD Y5V/T 0.47u/50V Z 0805	GM047458	79EN0499
C116	CAP SMD NPO/T 470P/50V J 0603	GM447152	79EN0514
C117	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C118	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C119	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C120	CAP ELECT 85oC/T 100u/16V M	GA310725	79PQ0199
C121	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C122	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C123	CAP SMD NPO/T 7P/50V C 0805	GM00705C	79PQ2148
C124	CAP SMD NPO/T 7P/50V C 0805	GM00705C	79PQ2148
C125	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C127	CAP ELECT 85oC/T 47u/16V M 6.3*7	80019871	79EN0108
C128	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C129	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C130	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C131	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C133	CAP SMD NPO/T 220P/50V J 0603	GM422152	79EN0510
C134	CAP SMD NPO/T 220P/50V J 0603	GM422152	79EN0510
C135	CAP ELECT 85oC/T 4.7u/50V M	GA347555	79PQ0208
C136	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C137	CAP SMD X7R/T 220P/50V K 0805	GM022153	79EN0493
C138	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C142	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C143	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C152	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C153	CAP ELECT 85oC/T 10u/25V M	GA310635	79EN0479
C154	CAP ELECT 85oC/T 10u/25V M	GA310635	79EN0479
C155	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C203H	CAP CERAMIC Z5V(F)/T 0.01u/50V Z	GB910358	79PQ0242
C205S	CAP CERAMIC Y5P(B)/T 1000P/2KV K	GB7102J3	79PQ1090
C210B	CAP PLASTIC MEF BOX/T 0.1u/250V J	GF210482	79PQ1586
C210G	CAP PLASTIC MEF BOX/T 0.1u/250V J	GF210482	79PQ1586
C210R	CAP PLASTIC MEF BOX/T 0.1u/250V J	GF210482	79PQ1586
C240B	CAP ELECT NP/T 4.7u/25V M	GA447535	79EN0483
C240G	CAP ELECT NP/T 4.7u/25V M	GA447535	79EN0483
C240R	CAP ELECT NP/T 4.7u/25V M	GA447535	79EN0483
C250B	CAP PLASTIC MEF BOX/T 0.1u/250V J	GF210482	79PQ1586
C250G	CAP PLASTIC MEF BOX/T 0.1u/250V J	GF210482	79PQ1586
C250R	CAP PLASTIC MEF BOX/T 0.1u/250V J	GF210482	79PQ1586
C251B	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C251G	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C251R	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C260	CAP ELECT 85oC/T 3.3u/250V M	GA333585	79EN0480
C261	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C262	CAP ELECT 85oC/T 100u/16V M	GA310725	79PQ0199
C264	CAP ELECT 85oC/T 100u/16V M	GA310725	79PQ0199
C265	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C266	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C271	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C274	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C275	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C276	CAP ELECT 85oC/T 10u/16V M	GA310625	79PQ0373
C281	CAP ELECT 105oC/T 22u/200V M	GA2226C5	79EN0102
C282	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C284	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C285	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C286	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C287	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C289	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C290	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C297	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C2C2	CAP SMD X7R/T 0.01u/50V K 0805	GM010353	79PQ1948
C2C3	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C2D0	CAP ELECT 85oC/T 220u/16V M	GA322725	79PQ0204
C2D1	CAP SMD X7R/T 0.1u/16V K 0603	GM410423	79EN0504
C2D2	CAP PLASTIC MEF BOX/T 0.01u/63V J	GF210362	79PQ0252

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
C2D3	CAP SMD NPO/T 100P/50V J 0603	GM410152	79EN0500
C2D4	CAP SMD X7R/T 0.01u/50V K 0805	GM010353	79PQ1948
C2D5	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C2D6	CAP SMD X7R/T 0.1u/16V K 0603	GM410423	79EN0504
C2D7	CAP SMD NPO/T 100P/50V J 0603	GM410152	79EN0500
C2E0	CAP SMD X7R/T 0.1u/16V K 0603	GM410423	79EN0504
C2E1	CAP SMD NPO/T 100P/50V J 0603	GM410152	79EN0500
C2P0	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C2P1	CAP SMD X7R/T 0.01u/50V K 0805	GM010353	79PQ1948
C2P2	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C2P4	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C2P6	CAP CERAMIC Y5P(B)/T 1000P/500V K	GB7102F3	79PQ0234
C2P8	CAP CERAMIC Y5P(B)/T 1000P/500V K	GB7102F3	79PQ0234
C2W0	CAP SMD NPO/T 100P/50V J 0603	GM410152	79EN0500
C2W1	CAP SMD NPO/T 100P/50V J 0603	GM410152	79EN0500
C401	CAP ELECT 105oC/A 1000u/25V M	GAB10835	79PQ0223
C402	CAP ELECT 105oC/A 1000u/25V M	GAB10835	79PQ0223
C403	CAP CERAMIC Y5P(B)/T 470P/50V K	GB747153	79PQ0238
C404	CAP ELECT 105oC/T 100u/50V M	GA210755	79EN0472
C405	CAP PLASTIC MEF BOX/T 0.22u/100V J	GF222472	79PQ0757
C406	CAP CERAMIC Y5P(B)/T 470P/50V K	GB747153	79PQ0238
C407	CAP PLASTIC MEF BOX/T 0.0015u/50V J	GF215252	79PQ2238
C410	CAP PLASTIC MEF BOX/T 0.047u/100V J	GF247372	79EN0490
C501	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C502	CAP SMD NPO/T 220P/50V J 0603	GM422152	79EN0510
C503	CAP PLASTIC MEF BOX/T 0.1u/63V J	GF210462	79PQ0253
C504	CAP SMD X7R/T 0.022u/50V K 0603	GM422353	79EN0511
C505	CAP CERAMIC Y5P(B)/T 2200P/500V K	GB7222F3	79PQ1717
C506	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C507	CAP ELECT 105oC/A 470u/35V M	GAB47745	79EN0485
C550	CAP FILM FLSA(445) 1.8KV 332H-FC15.0mm	80019131	79EN0118
C560	CAP CERAMIC Y5P(B)/T 680P/500V K	GB7681F3	79EN0488
C561	CAP CERAMIC Y5P(B)/T 470P/500V K	GB7471F3	79PQ0854
C562	CAP SMD X7R/T 4700P/50V K 0805	GM047253	79EN0496
C564	CAP FILM FHSM(165) 250V 135J-FC7.5mm	80019041	79EN0110
C565	CAP FILM FHSM(165) 250V 154J-FC7.5mm	80019051	79EN0111
C566	CAP FILM FHSM(165) 250V 563J-FC7.5mm	80019101	79EN0115
C567	CAP FILM FHSM(165) 250V 474J-FC7.5mm	80019091	79EN0114
C568	CAP FILM FHSM(165) 250V 244J-FC7.5mm	80019071	79EN0112
C575	CAP FILM FHSM(165) 250V 824J-FC7.5mm	80019121	79EN0117
C576	CAP FILM FHSM(165) 250V 623J-FC7.5mm	80019111	79EN0116
C577	CAP FILM FHSM(165) 250V 623J-FC7.5mm	80019111	79EN0116
C578	CAP FILM FHSM(165) 250V 433J-FC7.5mm	80019081	79EN0113
C580	CAP FILM FHSM(165) 250V 243J-FC7.5mm	80019061	79EN0047
C590	CAP CERAMIC SL/T 100P/2KV J	80019621	79EN0413
C591	CAP CERAMIC Y5P(B)/T 2200P/250V K	GB722283	79EN0094
C5A1	CAP ELECT 105oC/A 2200u/10V M	GAB22815	79EN0099
C5A2	CAP ELECT 105oC/A 2200u/10V M	GAB22815	79EN0099
C5C1	CAP SMD NPO/T 330P/50V J 0805	GM033152	79EN0120
C5C3	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C5C4	CAP SMD NPO/T 18P/50V J 0603	GM418052	79EN0508
C5C5	CAP SMD X7R/T 1000P/50V K 0603	GM410253	79EN0502
C5C7	CAP PLASTIC MEF BOX/T 0.01u/63V J	GF210362	79PQ0252
C5C8	CAP PLASTIC MEF BOX/T 0.1u/63V J	GF210462	79PQ0253
C5C9	CAP ELECT 105oC/T 2.2u/50V M	GA222555	79EN0101
C5D0	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C5D1	CAP ELECT 85oC/T 220u/16V M	GA322725	79PQ0204
C5D4	CAP PLASTIC MEF BOX/T 0.1u/250V J	GF210482	79PQ1586
C5F0	CAP ELECT 105oC/T 47u/250V M	GA247685	79EN0105
C5F1	CAP ELECT 105oC/T 33u/250V M	GA233685	79EN0104
C5G0	CAP ELECT 105oC/T 2.2u/250V M	GA222585	79PQ1914
C5G1	CAP ELECT 105oC/T 2.2u/200V M	GA2225C5	79EN0474
C5G2	CAP ELECT 105oC/T 3.3u/200V M	GA2335C5	79EN0477
C601	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C602	CAP ELECT 85oC/T 100u/16V M	GA310725	79PQ0199
C603	CAP SMD X7R/T 0.018u/50V K 0805	GM018353	79EN0492
C604	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C605	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C606	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C607	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C608	CAP ELECT 85oC/T 100u/16V M	GA310725	79PQ0199
C609	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C610	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C611	CAP SMD X7R/T 0.1u/25V K 0603	GM410433	79EN0505
C612	CAP ELECT 85oC/T 470u/16V M	GA347725	79PQ0851
C613	CAP SMD X7R/T 0.1u/25V K 0603	GM410433	79EN0505
C614	CAP SMD X7R/T 0.047u/25V K 0603	GM447333	79EN0517
C615	CAP SMD X7R/T 4700P/50V K 0805	GM047253	79EN0496
C616	CAP SMD X7R/T 0.047u/25V K 0603	GM447333	79EN0517
C617	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C618	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C619	CAP SMD NPO/T 1000P/50V J 0805	GM010252	79PQ1947
C620	CAP ELECT 85oC/T 470u/10V M	GA347715	79EN0482
C621	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C622	CAP SMD X7R/T 0.047u/50V K 0805	GM047353	79EN0497

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
C623	CAP ELECT 85oC/T 10u/50V M	GA310655	79PQ0198
C624	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C625	CAP ELECT /T 105oC 47u/25V M ZL	80015161	79EN0378
C626	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C627	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C628	CAP SMD X7R/T 0.082u/25V J 0805	80014341	79EN0343
C630	CAP ELECT 85oC/T 330u/6.3V M	GA333705	79EN0106
C631	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C632	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C633	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C634	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C635	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C636	CAP ELECT 85oC/T 33u/6.3V M	GA333605	79EN0481
C638	CAP SMD NPO/T 100P/50V J 0603	GM410152	79EN0500
C639	CAP SMD NPO/T 100P/50V J 0603	GM410152	79EN0500
C6A1	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6A2	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6A3	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6A4	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6A5	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6A6	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6A7	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6A8	CAP SMD NPO/T 33P/50V J 0603	GM433052	79EN0513
C6A9	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6B3	CAP ELECT 105oC/T 330u/16V M	GA233725	79PQ1918
C6B4	CAP ELECT 85oC/T 10u/50V M	GA310655	79PQ0198
C6B5	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C6B8	CAP ELECT 85oC/T 47u/16V M	GA347625	79PQ0210
C700	CAP ELECT 85oC/T 10u/50V M	GA310655	79PQ0198
C701	CAP ELECT /A 105oC 470u 100V M YXA BULK	80020071	79EN0421
C702	CAP FILM /T PPN 2200p 800V J PD	80018681	79EN0109
C703	CAP FILM /T PPN 8200p/630V J	80014121	79EN0335
C704	CAP ELECT 105oC/T 22u/50V M	GA222655	79EN0103
C705	CAP SMD X7R/T 0.22u/25V K 0805	GM022433	79EN0123
C706	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C707	CAP SMD NPO/T 330P/50V J 0805	GM033152	79EN0120
C708	CAP SMD X7R/T 0.033u/50V K 0805	GM033353	79EN0495
C709	CAP SMD X7R/T 0.33u/16V K 0805	GM033423	79EN0124
C710	CAP SMD Y5V/T 1u/16V Z 0805	GM010528	79EN0491
C711	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C712	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C713	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C714	CAP SMD X7R/T 0.1u/50V K 0805	GM010453	79PQ1388
C715	CAP SMD NPO/T 82P/50V J 0805	GM082052	79EN0121
C716	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C717	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C718	CAP SMD X7R/T 0.068u/25V K 0805	GM068333	79EN0122
C719	CAP ELECT 105oC/T 2.2u/50V M	GA222555	79EN0101
C720	CAP SMD X7R/T 0.1u/50V K 0805	GM010453	79PQ1388
C721	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C722	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C723	CAP ELECT /T 85oC 2200u 6.3V M LB	80017831	79EN0098
C724	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C725	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C726	CAP ELECT 105oC/T 1u/50V M	GA210555	79PQ1564
C727	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C728	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C729	CAP SMD Y5V/T 0.47u/50V Z 0805	GM047458	79EN0499
C730	CAP ELECT 105oC/T 10u/50V M	GA210655	79EN0100
C731	CAP ELECT NP 85oC/T 10u/50V M	GA410655	79PQ1083
C732	CAP ELECT 85oC/T 10u/50V M	GA310655	79PQ0198
C7A1	CAP ELECT /T 105oC 2.2u 450V M PF	80017771	79EN0097
C7A2	CAP CERAMIC Y5P(B)/T 330P/500V K	GB7331F3	79EN0487
C7B1	CAP ELECT 105oC/T 47u/100V M	GA247675	79PQ1080
C7B2	CAP PLASTIC MEF BOX/T 0.33u/100V J	GF233472	79PQ0761
C801	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C805	CAP ELECT 105oC/T 220u/25V M	GA222735	79EN0475
C806	CAP ELECT 105oC/T 220u/25V M	GA222735	79EN0475
C807	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C811	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C812	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C813	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C814	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C815	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C816	CAP SMD NPO/T 470P/50V J 0603	GM447152	79EN0514
C817	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C818	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C819	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C820	CAP SMD NPO/T 470P/50V J 0603	GM447152	79EN0514
C821	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C827	CAP SMD X7R/T 0.1u/25V K 0805	GM010433	79PQ1949
C828	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C829	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C830	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C831	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
C832	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C834	CAP SMD NPO/T 470P/50V J 0603	GM447152	79EN0514
C835	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C836	CAP SMD X7R/T 0.1u/25V K 0603	GM410433	79EN0505
C838	CAP SMD NPO/T 470P/50V J 0603	GM447152	79EN0514
C840	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C841	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C842	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C843	CAP SMD NPO/T 470P/50V J 0603	GM447152	79EN0514
C844	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C845	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C846	CAP SMD X7R/T 4700P/50V K 0603	GM447253	79EN0516
C847	CAP SMD NPO/T 470P/50V J 0603	GM447152	79EN0514
C848	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C849	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C8A1	CAP SMD NPO/T 22P/50V J 0603	GM422052	79EN0509
C8A2	CAP SMD NPO/T 150P/50V J 0603	GM415152	79EN0507
C8A3	CAP SMD NPO/T 33P/50V J 0603	GM433052	79EN0513
C8A4	CAP SMD NPO/T 33P/50V J 0603	GM433052	79EN0513
C8A5	CAP ELECT /T 105oC 220u 25V M EL	80017801	79EN0747
C8A6	CAP ELECT /T 105oC 220u 25V M EL	80017801	79EN0747
C8A8	CAP SMD NPO/T 22P/50V J 0603	GM422052	79EN0509
C8A9	CAP SMD NPO/T 150P/50V J 0603	GM415152	79EN0507
C901	CAP SAFETY X-CAP 1u/AC275V M	GJ010509	79EN0751
C902	CAP SAFETY Y-CAP/D 2200P 400V M	80018881	79EN0752
C903	CAP SAFETY Y-CAP/D 2200P 400V M	80018881	79EN0752
C906	CAP PLASTIC MEF BOX/T 1 /450V K	80014091	79EN0334
C907	CAP PLASTIC MEF BOX/T 0.1u/63V J	GF210462	79PQ0253
C908	CAP PLASTIC MEF BOX/T 0.68u/50V J	GF268452	79PQ1194
C909	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C910	CAP SMD X7R/T 470P/50V K 0603	GM447153	79EN0515
C911	CAP ELECT /A 85oC 220u 450V M HP3	80019661	79EN0095
C912	CAP FILM MEF BOX/A 0.033u 630V K	80019471	79EN0055
C914	CAP CERAMIC SL/T 220P/2KV J	80013921	79EN0332
C915	CAP ELECT 105oC/T 47u/35V M	GA247645	79EN0478
C916	CAP SMD NPO/T 1000P/25V J 0603	GX410232	79EN0783
C917	CAP SMD X7R/T 470P/50V K 0603	GM447153	79EN0515
C918	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C919	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C920	CAP SMD X7R/T 0.047u/25V K 0603	GM447333	79EN0517
C921	CAP SMD X7R/T 0.01u/50V K 0603	GM410353	79EN0503
C930	CAP ELECT 105oC/T 47u/16V M	GA247625	79PQ1079
C931	CAP ELECT 105oC/T 100u/35V M	GA210745	79PQ1913
C932	CAP PLASTIC MEF BOX/T 0.01u/63V J	GF210362	79PQ0252
C935	CAP ELECT 105oC/T 47u/35V M	GA247645	79EN0478
C938	CAP SMD X7R/T 0.047u/25V K 0603	GM447333	79EN0517
C939	CAP FILM MEF BOX/A 0.033u 630V K	80019471	79EN0055
C961	CAP ELECT /T 105oC 100u 250V M YXA	80014151	79EN0336
C962	CAP ELECT 105oC/T 33u/250V M	GA233685	79EN0104
C963	CAP ELECT /T 105oC 82u 100V M ZL	80014241	79EN0340
C964	CAP ELECT /T 105oC 820u 25V M ZL	80014231	79EN0339
C965	CAP ELECT /T 105oC 820u 25V M ZL	80014231	79EN0339
C966	CAP PLASTIC MEF BOX/T 0.01u/63V J	GF210362	79PQ0252
C967	CAP ELECT /T 105oC 22u 100V M YXA	80014181	79EN0337
C968	CAP ELECT /T 105oC 100u 16V M YXA	80020021	79EN0096
C969	CAP ELECT /T 105oC 120u 16V M ZL	80020031	79EN0417
C971	CAP ELECT /T 105oC 2200u 10V M ZL	80019841	79EN0414
C972	CAP ELECT /T 105oC 220u 16V M YXA	80020041	79EN0722
C973	CAP PLASTIC MEF BOX/T 0.39u/50V J	GF239452	79EN0489
C9A0	CAP ELECT /T 105oC 150u 35V M EL	80017761	79EN0746
C9A1	CAP ELECT /T 105oC 150u 35V M EL	80017761	79EN0746
C9A2	CAP CERAMIC Y5P(B)/T 1000P/500V K	GB7102F3	79PQ0234
C9A3	CAP CERAMIC Y5P(B)/T 1000P/500V K	GB7102F3	79PQ0234
CONNECTOR			
CN101	CONNECTOR A2502WV2-7P	80018151	79EN0023
CN102	CONNECTOR A2502WV2-8P	80018161	79EN0024
CN103	CONNECTOR-FE 19FE-BT-VK-N	80013591	79EN0320
CN104	CONNECTOR A2502WV2-4P	80018131	79EN0021
CN201	CONNECTOR TP00705-51	80013621	79EN0322
CN212	CONNECTOR-FE 19FE-BT-VK-N	80013591	79EN0320
CN216	D-SUB CONNECTOR(DV11201-R3)	80013571	79EN0319
CN401	CONNECTOR A3963WV2-A3P-D	80018201	79EN0026
CN550	CONNECTOR A3963WV2-6P	80018211	79EN0126
CN802	CONNECTOR-XH B2B-XH-AM	80013651	79EN0323
CN803	CONNECTOR-XH B3B-XH-AM	80013661	79EN0324
CN804	CONNECTOR A2502WV2-6P	80018141	79EN0022
CN8A1	CONNECTOR-XH B4B-XH-AM	80013671	79EN0325
CN901	CONNECTOR-VH B2P3-VH-B	80013601	79EN0321
CN902	FUSE HOLDER 5*20mm	R0180028	79PQ1198
CN903	FUSE HOLDER 5*20mm	R0180028	79PQ1198
CN904	CONNECTOR-VH B2P3-VH-B	80013601	79EN0321
CN905	CONNECTOR A3963WV2-A3PG-D	80019611	79EN0059
CN951	CONNECTOR A2502WV2-10P	80018121	79EN0020
CN952	CONNECTOR A2502WV2-9P	80018171	79EN0025
CN953	CONNECTOR A2502WV2-7P	80018151	79EN0023

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
CN9A2	CONNECTOR A2502WV2-6P	80018141	79EN0022
CN9A3	CONNECTOR A3963WV2-A3PG-D	80019611	79EN0059
J600	CONNECTOR A2541WVZ-C2X8P	80018191	79EN0393
J601	CONNECTOR A2541WVZ-C2X8P	80018191	79EN0393
DIODE			
D101	DIODE SMD 1SS355TE-17	80015251	79EN0381
D102	DIODE SMD 1SS355TE-17	80015251	79EN0381
D210B	DIODE/T 1SS244	80004711	79PQ1755
D210G	DIODE/T 1SS244	80004711	79PQ1755
D210R	DIODE/T 1SS244	80004711	79PQ1755
D211B	DIODE/T 1SS244	80004711	79PQ1755
D211G	DIODE/T 1SS244	80004711	79PQ1755
D211R	DIODE/T 1SS244	80004711	79PQ1755
D250B	DIODE/T 1SS244	80004711	79PQ1755
D250G	DIODE/T 1SS244	80004711	79PQ1755
D250R	DIODE/T 1SS244	80004711	79PQ1755
D251B	DIODE/T 1SS244	80004711	79PQ1755
D251G	DIODE/T 1SS244	80004711	79PQ1755
D251R	DIODE/T 1SS244	80004711	79PQ1755
D261	DIODE "T" 1N4148	EJ044148	79PQ0065
D262	DIODE "T" 1N4148	EJ044148	79PQ0065
D263	DIODE "T" 1N4148	EJ044148	79PQ0065
D264	DIODE "T" 1N4148	EJ044148	79PQ0065
D2C6	DIODE "T" 1N4148	EJ044148	79PQ0065
D2C7	DIODE "T" 1N4148	EJ044148	79PQ0065
D401	DIODE/T 1N4005	80009721	79PQ1782
D501	DIODE "T" 1N4148	EJ044148	79PQ0065
D502	DIODE/A 5A/60V SB560L 19C2-406	80014701	79EN0359
D550	DIODE /A 5A/1700V 5VUZ52	80019301	79EN0052
D560	DIODE/T 1A/400V RGP10G	80014611	79EN0353
D5A1	DIODE/T 1A/200V EGP10D	80014641	79EN0355
D5A2	DIODE/T 1A/200V EGP10D	80014641	79EN0355
D5C0	DIODE/T 0.6A/200V UG06D	80014751	79EN0362
D5C1	DIODE "T" 1N4148	EJ044148	79PQ0065
D5C3	DIODE/T 1SS244	80004711	79PQ1755
D5C4	DIODE SMD 1SS355TE-17	80015251	79EN0381
D5C5	DIODE "T" 1N4148	EJ044148	79PQ0065
D5C7	DIODE "T" 1N4148	EJ044148	79PQ0065
D5F0	DIODE/T 1N4005	80009721	79PQ1782
D5F2	DIODE /A 1.5A/600V S2L60 bulk	80020051	79EN0419
D5G0	DIODE/T 1N4005	80009721	79PQ1782
D5G1	DIODE/T 1N4005	80009721	79PQ1782
D600	DIODE SMD 1SS355TE-17	80015251	79EN0381
D601	DIODE SMD 1SS355TE-17	80015251	79EN0381
D6A3	DIODE SMD 1SS355TE-17	80015251	79EN0381
D701	DIODE/A UF5408 19C2-411	80009771	79PQ1787
D702	DIODE/T 1A/400V UF4004	80014651	79EN0356
D703	DIODE/T 1A/400V UF4004	80014651	79EN0356
D704	DIODE CB903-4SV1	80014711	79EN0360
D706	DIODE SMD 1SS355TE-17	80015251	79EN0381
D709	DIODE/T 1A/200V ERA15-02	80014691	79EN0011
D710	DIODE SMD 1SS355TE-17	80015251	79EN0381
D713	DIODE "T" 1N4148	EJ044148	79PQ0065
D716	DIODE "T" 1N4148	EJ044148	79PQ0065
D7A1	DIODE/A 1A/600V UF4005 19C2-004	80014671	79EN0358
D7B1	DIODE "T" 1N4148	EJ044148	79PQ0065
D7B2	DIODE "T" 1N4148	EJ044148	79PQ0065
D901	DIODE /A GBU6JL BU04	80019801	79EN0130
D902	DIODE /A 5A/600V FSF05A60 TO-220	80018851	79EN0086
D904	DIODE/T 1A/1KV UF4007	80014661	79EN0357
D905	DIODE/T 1SS244	80004711	79PQ1755
D907	DIODE "T" 1N4148	EJ044148	79PQ0065
D908	DIODE "T" 1N4148	EJ044148	79PQ0065
D909	DIODE "T" 1N4148	EJ044148	79PQ0065
D911	DIODE "T" 1N4148	EJ044148	79PQ0065
D912	DIODE/T 1SS244	80004711	79PQ1755
D930	DIODE/T 1A/1KV UF4007	80014661	79EN0357
D932	DIODE/T 0.6A/200V UG06D	80014751	79EN0362
D933	DIODE/T 1.2A/600V RM10A	80014741	79EN0361
D934	DIODE "T" 1N4148	EJ044148	79PQ0065
D950	DIODE "T" 1N4148	EJ044148	79PQ0065
D961	DIODE /A 2A/1KV RG4C 015-304	80019811	79EN0127
D963	DIODE /A 3A/400V RG4 015-304	80019821	79EN0128
D964	DIODE /A 5A/60V FSQ05A06 TO-220	80018861	79EN0129
D965	DIODE /A 5A/60V FSQ05A06 TO-220	80018861	79EN0129
D966	DIODE "T" 1N4148	EJ044148	79PQ0065
D967	DIODE /T 1A/40V SB140/23	80017961	79EN0090
D968	DIODE "T" 1N4148	EJ044148	79PQ0065
D969	DIODE "T" 1N4148	EJ044148	79PQ0065
D970	DIODE "T" 1N4148	EJ044148	79PQ0065
D971	DIODE /A 10A/60V FMB-26L TO-220	80019831	79EN0723
D973	DIODE "T" 1N4148	EJ044148	79PQ0065
D976	DIODE /T 1A/40V SB140/23	80017961	79EN0090
D979	DIODE /T 1A/200V RGP10D/23	80017951	79EN0390
D980	DIODE "T" 1N4148	EJ044148	79PQ0065

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
LED101	LED L-59GH/1GYC	80000131	79PQ0021
MD240B	DIODE SMD 0.1A/80V DUAL KDS226	80018231	79EN0394
MD240G	DIODE SMD 0.1A/80V DUAL KDS226	80018231	79EN0394
MD240R	DIODE SMD 0.1A/80V DUAL KDS226	80018231	79EN0394
MD717	DIODE SMD 0.2A/30V BAT54C(Fairchild)	80019521	79EN0056
ZD100	ZEN DIODE 1/2W(T) HZ6A2 (HITACHI)	EKA00601	79PQ2477
ZD102	ZEN-DIODE SMD UDZS_TE17_5.6B	80018921	79EN0404
ZD103	ZEN DIODE 1/2W(T) HZ6A2 (HITACHI)	EKA00601	79PQ2477
ZD104	ZEN-DIODE SMD UDZS_TE17_5.6B	80018921	79EN0404
ZD105	ZEN-DIODE SMD UDZS_TE17_5.6B	80018921	79EN0404
ZD106	ZEN DIODE 1/2W(T) HZ6A2 (HITACHI)	EKA00601	79PQ2477
ZD107	ZEN DIODE 1/2W(T) HZ6A2 (HITACHI)	EKA00601	79PQ2477
ZD108	ZEN DIODE 1/2W(T) HZ6A2 (HITACHI)	EKA00601	79PQ2477
ZD2C4	ZEN-DIODE SMD UDZS_TE17_5.6B	80018921	79EN0404
ZD2C5	ZEN-DIODE SMD UDZS_TE17_5.6B	80018921	79EN0404
ZD2H5	ZEN-DIODE SMD KDZ5.6V	80018331	79EN0032
ZD2V5	ZEN-DIODE SMD KDZ5.6V	80018331	79EN0032
ZD402	ZEN DIODE 1/2W(T) HZ5C1 (HITACHI)	EKA00506	79PQ1816
ZD5F1	ZEN DIODE 1/2W(T) HZ11A1 (HITACHI)	EKA00110	79EN0424
ZD6A2	ZEN DIODE 1/2W(T) HZ5B3 (HITACHI)	EKA00505	79EN0425
ZD701	ZEN-DIODE SMD KDZ12V	80019761	79EN0064
ZD702	ZEN-DIODE SMD KDZ12V	80019761	79EN0064
ZD705	ZEN DIODE 1/2W(T) HZ11B2 (HITACHI)	EKA01104	79EN0071
ZD707	ZEN DIODE 1/2W(T) HZ5C1 (HITACHI)	EKA00506	79PQ1816
ZD708	ZEN DIODE 1/2W(T) HZ5C1 (HITACHI)	EKA00506	79PQ1816
ZD712	ZEN DIODE 1/2W(T) HZ6A2 (HITACHI)	EKA00601	79PQ2477
ZD715	ZEN DIODE 1/2W(T) HZ5C3 (HITACHI)	EKA00508	79PQ1817
ZD901	ZEN-DIODE 1/2W(T) HZ24-2 (HITACHI)	EKA0240B	79EN0426
ZD902	ZEN-DIODE 1/2W(T) HZ24-2 (HITACHI)	EKA0240B	79EN0426
ZD971	ZEN DIODE P6KE6.8(GS)	80019931	79EN0069
FUSE			
F901	FUSE 215-T5.0AH AC250V	80014871	79EN0366
IC			
IC100	IC SMD XC61CN4502MR	80019291	79EN0051
IC101	IC SMD LM324DT	80019201	79EN0408
IC102	IC HD6432128SWA04PS VD201	80020111	79EN0776
IC104	IC SMD 24LC32AT/SN	80018601	79EN0137
IC105	IC SMD TC7W53F	80019681	79EN0061
IC210	IC LINEAR LM2415	80003941	79PQ2168
IC211	IC CXA2153S	80019641	79EN0060
IC212	IC MTV038N20-16(OSD)	80018801	79EN0043
IC213	IC SMD KIA4558F	80018241	79EN0395
IC215	IC SMD 74VHCT14ASJX	80019781	79EN0091
IC218	IC SMD 24LC21AT/SN	80018591	79EN0136
IC401	IC LA7841	80007691	79PQ1761
IC5C0	IC BA9757	80014481	79EN0349
IC601	IC SMD CP267P151-1	80015311	79EN0383
IC602	IC SMD TA48M033F(TE16L) (3.3VReg)	80015221	79EN0720
IC603	IC SMD BA4558F-E2(OP-AMP)	80007761	79PQ1762
IC6A1	IC SMD 74VHC14SJX	80017901	79EN0388
IC6A2	IC SMD TL084CD	80019211	79EN0409
IC6A3	IC SMD KIA4558F	80018241	79EN0395
IC6A4	IC KIA7027AP	80014571	79EN0352
IC701	IC SMD MSPCS03	80018671	79EN0042
IC702	IC BA4558F-E2(OP-AMP)	80007761	79PQ1762
IC703	IC SMD LM324DT	80019201	79EN0408
IC801	IC LA6510	80014501	79EN0351
IC803	IC LA6510	80014501	79EN0351
IC804	IC LA6510	80014501	79EN0351
IC8A1	HIC STK391-110	80014821	79EN0365
IC901	IC MC33262P	80014491	79EN0350
IC902	IC STR-F6676	80019021	79EN0406
IC903	IC MIP2E3	80018571	79EN0040
IC921	IC KIA431AZTA	80003831	79PQ1488
IC922	IC KIA431AZTA	80003831	79PQ1488
IC923	IC KIA7812API(TO-220)	80010651	79PQ1812
PC901	IC PHOTO COUPLER PC123Y22	80015891	79EN0387
PC902	IC PHOTO COUPLER PC123Y22	80015891	79EN0387
PC903	IC PHOTO COUPLER PC123Y22	80015891	79EN0387
COIL, FILTER			
L200B	BEAD FBR07UA850	80015051	79EN0377
L200G	BEAD FBR07UA850	80015051	79EN0377
L200R	BEAD FBR07UA850	80015051	79EN0377
L201B	PEAKING COIL/T 0.27uH K	HB012278	79EN0520
L201G	PEAKING COIL/T 0.27uH K	HB012278	79EN0520
L201R	PEAKING COIL/T 0.27uH K	HB012278	79EN0520
L211B	PEAKING COIL/T 0.18uH K	HB012188	79EN0519
L211G	PEAKING COIL/T 0.18uH K	HB012188	79EN0519
L211R	PEAKING COIL/T 0.18uH K	HB012188	79EN0519
L280	BEAD WBRID-2.3*7.5*5.5-TF8	80017551	79EN0085
L281	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L282	PEAKING COIL/T 100uH J	80014941	79EN0372
L283	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L2C1	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L2D0	FER SMD SMB-201209-N2-121L	80017521	79EN0013

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
L2D1	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L2H5	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L2P0	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L2P2	BEAD WBRID-2.3*7.5*5.5-TF8	80017551	79EN0085
L2P4	BEAD WBRID-2.3*7.5*5.5-TF8	80017551	79EN0085
L2P6	BEAD WBRID-2.3*7.5*5.5-TF8	80017551	79EN0085
L2V5	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L2W0	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L2W1	FER SMD SMB-201209-N2-121L	80017521	79EN0013
L550	BEAD FBR07HA850	80015521	79EN0386
L561	COIL LINEARITY 77A-0001	80017701	79EN0125
L5A1	CHOKE COIL 41101 (NSV)	80014921	79EN0370
L5G0	PACKING COIL/A 2200uH J	80014911	79EN0369
L5G2	PACKING COIL/A 1200uH J	80014901	79EN0368
L5G3	PACKING COIL/A 1000uH J	HB020102	79EN0521
L5G4	PACKING COIL/A 1000uH J	HB020102	79EN0521
L600	FER SMD SMB-201209-N1-601A	80017511	79EN0012
L601	FER SMD SMB-201209-N1-601A	80017511	79EN0012
L602	FER SMD SMB-201209-N1-601A	80017511	79EN0012
L603	FER SMD SMB-201209-N1-601A	80017511	79EN0012
L604	FER SMD SMB-201209-N1-601A	80017511	79EN0012
L6A1	FER SMD SMB-201209-N1-601A	80017511	79EN0012
L6A2	FER SMD SMB-201209-N1-601A	80017511	79EN0012
L701	PACKING COIL/A 3.3uH K	HB020339	79PQ1960
L702	PACKING COIL/A 3.3uH K	HB020339	79PQ1960
L703	BEAD FBR07HA850	80015521	79EN0386
L704	BEAD FBR07HA850	80015521	79EN0386
L8A1	PACKING COIL/A 100uH K	HB020101	79PQ1957
L8A2	PACKING COIL/A 100uH K	HB020101	79PQ1957
L901	COIL LINE-FILTER LFZ24V12(DELTA)	80017711	79EN0088
L902	LINE-FILTER SN10P-601JB	80015021	79EN0375
L903	COIL CHOKE SRW35EC-T77V012(TDK)	80019251	79EN0087
L905	BEAD FBR07VB850	80015041	79EN0376
L906	BEAD WBRID-2.3*7.5*5.5-TF8	80017551	79EN0085
L960	PACKING COIL/A 47uH K	HB020470	79EN0522
L961	PACKING COIL/A 47uH K	HB020470	79EN0522
L971	PACKING COIL/A 47uH K	HB020470	79EN0522
*****TRANSISTOR*****			
MQ2C1	TR SMD NPN 0.1A/50V QUAD KRC860U	80018251	79EN0027
MQ2C2	TR SMD NPN 0.1A/50V QUAD KRC860U	80018251	79EN0027
MQ5C1	TR SMD NPN RN1502	80019361	79EN0411
Q100	TR SMD PNP 0.1A/50V KRA107S	80018301	79EN0397
Q101	TR SMD NPN 0.1A/50V KRC110S	80018271	79EN0028
Q102	TR SMD NPN 0.1A/50V KRC110S	80018271	79EN0028
Q103	TR SMD NPN 0.1A/50V KRC110S	80018271	79EN0028
Q105	TR SMD PNP 0.1A/50V KRA107S	80018301	79EN0397
Q250B	TR NPN BF422 TO-92(T)	EAA04220	79PQ0811
Q250G	TR NPN BF422 TO-92(T)	EAA04220	79PQ0811
Q250R	TR NPN BF422 TO-92(T)	EAA04220	79PQ0811
Q251B	TR PNP BF423 TO-92(T)	EBA04230	79PQ0061
Q251G	TR PNP BF423 TO-92(T)	EBA04230	79PQ0061
Q251R	TR PNP BF423 TO-92(T)	EBA04230	79PQ0061
Q260	TR SMD NPN 0.1A/50V KRC420	80018281	79EN0029
Q281	TR SMD NPN 0.1A/50V KRC420	80018281	79EN0029
Q282	TR SMD NPN 0.1A/50V KRC110S	80018271	79EN0028
Q501	TR SMD N 2SK2158	80008091	79EN0241
Q502	TR SMD NPN 0.15A/50V KTC3875S-GR	80018291	79EN0030
Q503	TR SMD PNP 0.15A/50V KTA1504S-GR	80018321	79EN0031
Q504	FET N 2SK3205	80019311	79EN0053
Q550	TR NPN 2SC5570 TO-3P	80019341	79EN0054
Q560	TR NPN KTC2026-Y/GR TO220IS	80009921	79PQ2384
Q561	FET N IRFI630G	80018011	79EN0017
Q562	FET N IRFI630G	80018011	79EN0017
Q563	FET N IRFS654B	80017881	79EN0132
Q564	FET N IRFS654B	80017881	79EN0132
Q565	FET N IRFI640G	80018021	79EN0018
Q566	FET N IRFI640G	80018021	79EN0018
Q567	FET N IRFS654B	80017881	79EN0132
Q568	FET N IRFI640G	80018021	79EN0018
Q569	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q570	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q571	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q572	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q573	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q574	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q575	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q576	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q5A1	TR NPN KTC2026-Y/GR TO220IS	80009921	79PQ2384
Q5A2	TR PNP KTA1046-Y/GR TO220IS	80009911	79PQ2385
Q5C0	TR SMD NPN 0.1A/50V KRC102S	80018261	79EN0396
Q5F0	TR NPN ET453MR-F143 TO-220F	80014291	79EN0342
Q5F1	FET P 2SJ512/A	80019321	79EN0410
Q601	TR SMD NPN DTC124EK/RT1N241C319	80015211	79EN0380
Q602	TR SMD NPN 0.15A/50V KTC3875S-GR	80018291	79EN0030
Q603	TR SMD NPN DTC124EK/RT1N241C319	80015211	79EN0380

SYMBOL NO.	DESCRIPTION/SPECIFICATION	PART NO.
Q604	TR SMD NPN DTC124EK/RT1N241C319 80015211	79EN0380
Q605	TR SMD PNP 0.15A/50V KTA1504S-GR 80018321	79EN0031
Q701	FET N 2SK2645-01/MR TO-220F 80000981	79PQ0791
Q702	TR SMD NPN 0.15A/50V KTC3875S-GR 80018291	79EN0030
Q703	TR SMD PNP 0.15A/50V KTA1504S-GR 80018321	79EN0031
Q704	TR SMD NPN 0.1A/50V KRC102S 80018261	79EN0396
Q7A1	TR NPN 2SC4620 P-TV2 80008211	79PQ2020
Q7B1	TR NPN KTC4370/A_Y TO-220F 80014351	79EN0344
Q7B2	TR PNP KTA1659/A_Y TO-220F 80014361	79EN0345
Q7B3	TR NPN KTC3200-GR TO-92(T) 80018411	79EN0400
Q7B4	TR PNP KTA1268-GR TO-92(T) 80018441	79EN0033
Q7B5	TR NPN KTC3200-GR TO-92(T) 80018411	79EN0400
Q901	FET N 2SK2148-01R TO-3PF 80014411	79EN0348
Q902	TR PNP KRA224M TO-92(T) 80014401	79EN0347
Q903	TR SMD NPN 0.1A/50V KRC102S 80018261	79EN0396
Q904	TR SMD PNP 0.1A/50V KRA107S 80018301	79EN0397
Q905	TR SMD NPN 0.15A/50V KTC3875S-GR 80018291	79EN0030
Q950	TR NPN KRC105M TO-92(T) 80018381	79EN0399
Q961	TR SMD PNP 0.1A/50V KRA107S 80018301	79EN0397
Q962	TR NPN KRC102M TO-92(T) 80014321	79PQ2529
Q966	TR PNP 2SA1020_Y TO-92(T) EBA10205	79PQ1685
Q967	TR NPN KRC102M TO-92(T) 80014321	79PQ2529
*****RESISTOR*****		
272	RES CARBON 1/4W/M(T) 5% 10Kohm FA270103	79PQ2003
C220B	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
C220G	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
C220R	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP1	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP10	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP11	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP12	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP13	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP14	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP15	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP16	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP17	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP18	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP2	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP20	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP21	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP22	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP24	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP3	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP3	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP4	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP4	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP5	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP5	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP6	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP6	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP7	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
JP8	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
JP9	RES SMD 1/4W(T) 5% 0ohm 1206 FM110000	79EN0189
R100	RES SMD 1/8W(T) 5% 2.2Kohm 0805 FM100222	79EN0226
R101	RES CARBON 1/4W/M(T) 5% 470ohm FA270471	79PQ1840
R102	RES SMD 1/8W(T) 5% 10Kohm 0805 FM100103	79PQ1893
R103	RES SMD 1/8W(T) 5% 10Kohm 0805 FM100103	79PQ1893
R106	RES CARBON 1/4W/M(T) 5% 10Kohm FA270103	79PQ2003
R107	RES METAL 1/4W/M(T) 1% 220ohm FB272200	79EN0453
R108	RES CARBON 1/4W/M(T) 5% 10Kohm FA270103	79PQ2003
R109	RES CARBON 1/4W/M(T) 5% 4.7Kohm FA270472	79EN0436
R10B	RES METAL 1/4W/M(T) 1% 1Kohm FB271001	79PQ1861
R10C	RES METAL 1/4W/M(T) 1% 1Kohm FB271001	79PQ1861
R10D	RES METAL 1/4W/M(T) 1% 2.7Kohm FB272701	79EN0455
R10E	RES METAL 1/4W/M(T) 1% 910ohm FB279100	79EN0465
R10G	RES METAL 1/4W/M(T) 1% 330ohm FB273300	79EN0456
R10H	RES SMD 1/8W(T) 5% 100ohm 0805 FM100101	79PQ1891
R10J	RES SMD 1/8W(T) 5% 100ohm 0805 FM100101	79PQ1891
R10K	RES METAL 1/4W/M(T) 1% 2.7Kohm FB272701	79EN0455
R10L	RES METAL 1/4W/M(T) 1% 510ohm FB275100	79EN0460
R10M	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
R10Q	RES SMD 1/8W(T) 5% 0ohm 0805 FM100000	79PQ1890
R10R	RES SMD 1/8W(T) 5% 10Kohm 0805 FM100103	79PQ1893
R10S	RES SMD 1/8W(T) 5% 10Kohm 0805 FM100103	79PQ1893
R10T	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827
R10U	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827
R10V	RES SMD 1/8W(T) 5% 100ohm 0805 FM100101	79PQ1891
R10W	RES CARBON 1/4W/M(T) 5% 220ohm FA270221	79EN0433
R110	RES METAL 1/4W/M(T) 1% 330ohm FB273300	79EN0456
R111	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827
R112	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827
R113	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827
R114	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827
R115	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827
R116	RES CARBON 1/4W/M(T) 5% 100ohm FA270101	79PQ1827

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
R117	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R118	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R119	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R11A	RES SMD 1/8W(T) 5% 47Kohm 0805	FM100473	79EN0233
R11B	RES CARBON 1/4W/M(T) 5% 82Kohm	FA270823	79EN0439
R120	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R127	RES CARBON 1/4W/M(T) 5% 1Kohm	FA270102	79PQ1828
R128	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R130	RES CARBON 1/4W/M(T) 5% 10ohm	FA270100	79EN0427
R131	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R132	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R133	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R134	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R135	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R136	RES SMD 1/8W(T) 5% 1.5Kohm 0805	FM100152	79PQ1894
R137	RES SMD 1/8W(T) 1% 10Kohm 0805	FN101002	79PQ1902
R138	RES SMD 1/8W(T) 1% 100Kohm 0805	FN101003	79EN0192
R139	RES SMD 1/8W(T) 5% 1Mohm 0805	FM100105	79EN0225
R141	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R142	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R143	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R144	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R145	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R146	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R147	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R148	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R149	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R150	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R151	RES METAL 1/4W/M(T) 1% 18Kohm	FB271802	79PQ1864
R152	RES SMD 1/8W(T) 1% 7.5Kohm 0805	FN107501	79EN0218
R153	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R154	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R155	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R156	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R157	RES METAL 1/4W/M(T) 1% 10Kohm	FB271002	79PQ1862
R158	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R159	RES CARBON 1/4W/M(T) 5% 470ohm	FA270471	79PQ1840
R160	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R161	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R162	RES SMD 1/8W(T) 5% 1.8Kohm 0805	FM100182	79PQ1895
R163	RES SMD 1/8W(T) 5% 1.8Kohm 0805	FM100182	79PQ1895
R164	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R165	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R166	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R167	RES SMD 1/8W(T) 5% 47Kohm 0805	FM100473	79EN0233
R168	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R169	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R170	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R171	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R172	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R173	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R174	RES CARBON 1/4W/M(T) 5% 1Kohm	FA270102	79PQ1828
R176	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R177	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R178	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R179	RES CARBON 1/4W/M(T) 5% 47ohm	FA270470	79PQ2009
R180	RES CARBON 1/4W/M(T) 5% 47ohm	FA270470	79PQ2009
R181	RES METAL 1/4W/M(T) 1% 10Kohm	FB271002	79PQ1862
R182	RES METAL 1/4W/M(T) 1% 33Kohm	FB273302	79PQ1870
R184	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R185	RES SMD 1/8W(T) 1% 10Kohm 0805	FN101002	79PQ1902
R186	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R187	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R188	RES SMD 1/8W(T) 1% 4.7Kohm 0805	FN104701	79EN0214
R189	RES SMD 1/8W(T) 5% 47Kohm 0805	FM100473	79EN0233
R190	RES CARBON 1/4W/M(T) 5% 10ohm	FA270100	79EN0427
R192	RES SMD 1/8W(T) 1% 4.7Kohm 0805	FN104701	79EN0214
R194	RES SMD 1/8W(T) 1% 2.2Kohm 0805	FN102201	79EN0202
R195	RES SMD 1/8W(T) 5% 220ohm 0805	FM100221	79PQ1896
R196	RES SMD 1/8W(T) 1% 2.2Kohm 0805	FN102201	79EN0202
R197	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R198	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R199	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R200B	RES CARBON 1/2W/M(T) 5% 33ohm	FA360330	79EN0443
R200G	RES CARBON 1/2W/M(T) 5% 33ohm	FA360330	79EN0443
R200R	RES CARBON 1/2W/M(T) 5% 33ohm	FA360330	79EN0443
R203H	RES CARBON 1/2W/M(T) 5% 1.2ohm	FA360129	79EN0440
R205S	RES CARBON 1/2W/M(T) 5% 220ohm	80015271	79EN0382
R210B	RES CARBON 1/2W/M(T) 5% 120ohm	FA360121	79PQ1851
R210G	RES CARBON 1/2W/M(T) 5% 150ohm	FA360151	79EN0143
R210R	RES CARBON 1/2W/M(T) 5% 120ohm	FA360121	79PQ1851
R211B	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R211G	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R211R	RES CARBON 1/4W/M(T) 5% 150ohm	FA270151	79EN0430
R220B	RES SMD 1/4W(T) 5% 10ohm 1206	FM110100	79EN0190

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
R220G	RES SMD 1/4W(T) 5% 10ohm 1206	FM110100	79EN0190
R220R	RES SMD 1/4W(T) 5% 10ohm 1206	FM110100	79EN0190
R222B	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R222G	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R222R	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R240B	RES SMD 1/8W(T) 5% 47ohm 0805	FM100470	79EN0234
R240G	RES SMD 1/8W(T) 5% 47ohm 0805	FM100470	79EN0234
R240R	RES SMD 1/8W(T) 5% 47ohm 0805	FM100470	79EN0234
R241B	RES SMD 1/4W(T) 1% 75ohm 1206	FN117509	79EN0188
R241G	RES SMD 1/4W(T) 1% 75ohm 1206	FN117509	79EN0188
R241R	RES SMD 1/4W(T) 1% 75ohm 1206	FN117509	79EN0188
R250B	RES CARBON 1/2W/M(T) 5% 470Kohm	FA360474	79EN0145
R250G	RES CARBON 1/2W/M(T) 5% 470Kohm	FA360474	79EN0145
R250R	RES CARBON 1/2W/M(T) 5% 470Kohm	FA360474	79EN0145
R251B	RES CARBON 1/2W/M(T) 5% 220Kohm	FA360224	79PQ1854
R251G	RES CARBON 1/2W/M(T) 5% 220Kohm	FA360224	79PQ1854
R251R	RES CARBON 1/2W/M(T) 5% 220Kohm	FA360224	79PQ1854
R252B	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R252G	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R252R	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R253B	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R253G	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R253R	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R254B	RES SMD 1/8W(T) 1% 13Kohm 0805	FN101302	79PQ1903
R254G	RES SMD 1/8W(T) 1% 13Kohm 0805	FN101302	79PQ1903
R254R	RES SMD 1/8W(T) 1% 13Kohm 0805	FN101302	79PQ1903
R255B	RES SMD 1/8W(T) 1% 36Kohm 0805	FN103602	79EN0211
R255G	RES SMD 1/8W(T) 1% 36Kohm 0805	FN103602	79EN0211
R255R	RES SMD 1/8W(T) 1% 36Kohm 0805	FN103602	79EN0211
R256B	RES SMD 1/8W(T) 1% 22Kohm 0805	FN102202	79PQ1905
R256G	RES SMD 1/8W(T) 1% 22Kohm 0805	FN102202	79PQ1905
R256R	RES SMD 1/8W(T) 1% 22Kohm 0805	FN102202	79PQ1905
R260	RES SMD 1/8W(T) 1% 7.5Kohm 0805	FN107501	79EN0218
R261	RES METAL 1/4W/M(T) 1% 5.6Kohm	FB275601	79PQ1967
R263	RES SMD 1/8W(T) 1% 22Kohm 0805	FN102202	79PQ1905
R264	RES SMD 1/8W(T) 1% 6.8Kohm 0805	FN106801	79PQ2145
R265	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R266	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R267	RES SMD 1/8W(T) 1% 22Kohm 0805	FN102202	79PQ1905
R268	RES SMD 1/8W(T) 1% 20Kohm 0805	FN102002	79EN0204
R269	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R272	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R275	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R282	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R283	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R293	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R294	RES SMD 1/8W(T) 5% 220ohm 0805	FM100221	79PQ1896
R295	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R296	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R2A3	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R2A5	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R2C4	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R2C5	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R2C8	RES SMD 1/8W(T) 5% 15Kohm 0805	FM100153	79EN0224
R2C9	RES SMD 1/8W(T) 5% 47Kohm 0805	FM100473	79EN0233
R2D0	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R2D1	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R2D2	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R2D3	RES SMD 1/8W(T) 1% 5.6Kohm 0805	FN105601	79PQ1910
R2D4	RES CARBON 1/4W/M(T) 5% 10ohm	FA270100	79EN0427
R2D5	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R2D6	RES SMD 1/8W(T) 5% 47Kohm 0805	FM100473	79EN0233
R2E0	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R2E3	RES SMD 1/8W(T) 1% 1Mohm 0805	FN101004	79EN0201
R2E4	RES SMD 1/8W(T) 1% 5.6Kohm 0805	FN105601	79PQ1910
R2E5	RES SMD 1/8W(T) 5% 3.3Kohm 0805	FM100332	79EN0229
R2F1	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R2F2	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R2F3	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R2F4	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R2F5	RES SMD 1/8W(T) 1% 150ohm 0805	FN101500	79EN0196
R2F6	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R2H5	RES SMD 1/8W(T) 1% 2.2Kohm 0805	FN102201	79EN0202
R2H6	RES SMD 1/8W(T) 5% 47ohm 0805	FM100470	79EN0234
R2H8	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R2V5	RES SMD 1/8W(T) 1% 2.2Kohm 0805	FN102201	79EN0202
R2V6	RES SMD 1/8W(T) 5% 47ohm 0805	FM100470	79EN0234
R2V7	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R2V8	RES SMD 1/8W(T) 5% 10ohm 0805	FM100100	79EN0222
R2W0	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R2W1	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R2W2	RES CARBON 1/4W/M(T) 5% 10ohm	FA270100	79EN0427
R2W3	RES CARBON 1/4W/M(T) 5% 10ohm	FA270100	79EN0427
R2W4	RES SMD 1/8W(T) 5% 6.8Kohm 0805	FM100682	79EN0236
R2W5	RES SMD 1/8W(T) 5% 6.8Kohm 0805	FM100682	79EN0236

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
R403	RES MOF 1W/M(B) 5% 270ohm	FB480271	79EN0469
R404	RES CARBON 1/4W/M(T) 5% 1ohm	FA270109	79PQ1830
R405	RES METAL 1/4W/M(T) 1% 6.2Kohm	FB276201	79EN0464
R406	RES SMD 1/8W(T) 1% 5.6Kohm 0805	FN105601	79PQ1910
R407	RES METAL 1/4W/M(T) 1% 4.7Kohm	FB274701	79PQ1966
R408	RES METAL 1/4W/M(T) 1% 3.9Kohm	FB273901	79EN0458
R409	RES METAL 1/4W/M(T) 1% 5.6Kohm	FB275601	79PQ1967
R410	RES MFF /B 2W M 1% 0.56ohm ±50PPM	80019391	79EN0148
R411	RES SMD 1/8W(T) 1% 6.2Kohm 0805	FN106201	79PQ2170
R417	RES CARBON 1/2W/M(T) 5% 330ohm	FA360331	79EN0144
R418	RES METAL /T 1/4W M 5% 510ohm LT2200	80018471	79EN0147
R419	RES METAL /T 1/4W M 5% 510ohm LT2200	80018471	79EN0147
R501	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R502	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R503	RES CARBON 1/4W/M(T) 5% 2.2Kohm	FA270222	79PQ1835
R504	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R506	RES CARBON 1/4W/M(T) 5% 150ohm	FA270151	79EN0430
R507	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R508	RES FUSEABLE 1/2W(T) 5% 1ohm	80013911	79EN0331
R509	RES CARBON 1/2W/M(B)5% 56ohm	FA380560	79EN0448
R510	RES MOF 3W/M(A) 5% 8.2ohm	FB710829	79PQ2447
R511	RES MOF 3W/M(A) 5% 8.2ohm	FB710829	79PQ2447
R512	RES MOF 3W/M(A) 5% 8.2ohm	FB710829	79PQ2447
R513	RES MOF 3W/M(A) 5% 8.2ohm	FB710829	79PQ2447
R514	RES MOF 3W/M(A) 5% 0.22ohm	FB710228	79EN0151
R515	RES MOF 1W/M(B) 5% 27ohm	FB480270	79PQ1063
R560	RES MOF 1W/M(B) 5% 100ohm	FB480101	79PQ1062
R561	RES CARBON 1/2W/M(T) 5% 680ohm	FA360681	79EN0447
R562	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R563	RES MOF 3W/M(A) 5% 82ohm	FB710820	79EN0154
R564	RES MOF 3W/M(A) 5% 82ohm	FB710820	79EN0154
R565	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R566	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R567	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R568	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R569	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R570	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R571	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R572	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R573	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R574	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R575	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R576	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R577	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R578	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R579	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R580	RES CARBON 1/4W/M(T) 5% 100Kohm	FA270104	79PQ1829
R581	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R582	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R583	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R584	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R585	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R586	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R587	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R588	RES CARBON 1/4W/M(T) 5% 22Kohm	FA270223	79PQ2005
R5A3	RES CARBON 1/4W/M(T) 5% 470ohm	FA270471	79PQ1840
R5A4	RES CARBON 1/4W/M(T) 5% 470ohm	FA270471	79PQ1840
R5C0	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R5C1	RES SMD 1/8W(T) 1% 7.5Kohm 0805	FN107501	79EN0218
R5C2	RES METAL 1/4W/M(T) 1% 91Kohm	FB279102	79PQ1877
R5C3	RES CARBON 1/4W/M(T) 5% 47Kohm	FA270473	79EN0437
R5C4	RES SMD 1/8W(T) 1% 82Kohm 0805	FN108202	79EN0219
R5C5	RES SMD 1/8W(T) 5% 47Kohm 0805	FM100473	79EN0233
R5C9	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R5D0	RES SMD 1/8W(T) 1% 510ohm 0805	FN105100	79EN0216
R5D2	RES SMD 1/8W(T) 1% 18Kohm 0805	FN101802	79EN0199
R5D3	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R5D4	RES METAL 1/4W/M(T) 1% 6.8Kohm	FB276801	79PQ1873
R5D5	RES SMD 1/8W(T) 1% 6.8Kohm 0805	FN106801	79PQ2145
R5D6	RES SMD 1/8W(T) 1% 33Kohm 0805	FN103302	79PQ1907
R5E1	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R5E5	RES MOF 1W/M(B) 5% 33ohm	FB480330	79PQ0176
R5E6	RES SMD 1/8W(T) 1% 5.6Kohm 0805	FN105601	79PQ1910
R5F0	RES FUSEABLE 1/2W(T) 5% 2.7Kohm	80013901	79EN0330
R5F1	RES CARBON 1/4W/M(T) 5% 330Kohm	FA270334	79EN0434
R5F2	RES CARBON 1/4W/M(T) 5% 4.7Kohm	FA270472	79EN0436
R5F3	RES CARBON 1/4W/M(T) 5% 220ohm	FA270221	79EN0433
R5G0	RES MOF 3W/M(A) 5% 5.6ohm	FB710569	79PQ0185
R5G1	RES CARBON 1/2W/M(T) 5% 56ohm	FA360560	79EN0446
R5G2	RES CARBON 1/2W/M(T) 5% 68ohm	FA360680	79PQ1859
R5G3	RES CARBON 1/2W/M(T) 5% 47ohm	FA360470	79EN0445
R602	RES SMD 1/10W(T) 5% 33ohm 0603	FM010330	79EN0184
R603	RES SMD 1/10W(T) 5% 33ohm 0603	FM010330	79EN0184
R604	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R605	RES SMD 1/10W(T) 5% 10ohm 0603	FM010100	79EN0179

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
R606	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R607	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R608	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R609	RES SMD 1/10W(T) 5% 33Kohm 0603	FM010333	79EN0183
R610	RES SMD 1/10W(T) 5% 10Kohm 0603	FM010103	79EN0178
R611	RES SMD 1/10W(T) 5% 33Kohm 0603	FM010333	79EN0183
R612	RES SMD 1/10W(T) 5% 33Kohm 0603	FM010333	79EN0183
R614	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R615	RES SMD 1/10W(T) 5% 10Kohm 0603	FM010103	79EN0178
R616	RES SMD 1/10W(T) 5% 10Kohm 0603	FM010103	79EN0178
R617	RES SMD 1/10W(T) 5% 33Kohm 0603	FM010333	79EN0183
R618	RES SMD 1/10W(T) 5% 6.8Kohm 0603	FM010682	79EN0186
R619	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R620	RES SMD 1/10W(T) 1% 5.1Kohm 0603	FN015101	79EN0166
R621	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R622	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R623	RES SMD 1/10W(T) 5% 0ohm 0603	FM010000	79EN0175
R624	RES SMD 1/10W(T) 5% 10ohm 0603	FM010100	79EN0179
R625	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R626	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R627	RES SMD 1/10W(T) 5% 4.7Kohm 0603	FM010472	79EN0185
R628	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R629	RES SMD 1/10W(T) 1% 910ohm 0603	FN019100	79EN0174
R630	RES SMD 1/10W(T) 5% 1.5Mohm 0603	FM010155	79EN0176
R631	RES SMD 1/10W(T) 5% 680ohm 0603	FM010681	79EN0187
R632	RES SMD 1/10W(T) 5% 1Kohm 0603	FM010102	79EN0180
R633	RES SMD 1/10W(T) 1% 750ohm 0603	FN017500	79EN0170
R634	RES SMD 1/10W(T) 1% 75ohm 0603	FN017509	79EN0171
R635	RES SMD 1/10W(T) 5% 100Kohm 0603	FM010104	79EN0177
R636	RES SMD 1/10W(T) 1% 120ohm 0603	FN011200	79EN0156
R637	RES SMD 1/10W(T) 1% 560ohm 0603	FN015600	79EN0167
R638	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R639	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R640	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R641	RES SMD 1/10W(T) 5% 220ohm 0603	FM010221	79EN0181
R642	RES SMD 1/10W(T) 1% 9.1Kohm 0603	FN019101	79EN0173
R643	RES SMD 1/10W(T) 1% 1Kohm 0603	FN011001	79EN0159
R644	RES SMD 1/10W(T) 1% 680ohm 0603	FN016800	79EN0169
R645	RES SMD 1/10W(T) 1% 220Kohm 0603	FN012203	79EN0162
R646	RES SMD 1/10W(T) 1% 20Kohm 0603	FN012002	79EN0161
R647	RES SMD 1/10W(T) 1% 680Kohm 0603	FN016803	79EN0168
R648	RES SMD 1/10W(T) 1% 1.6Mohm 0603	FN011604	79EN0155
R649	RES SMD 1/10W(T) 1% 680Kohm 0603	FN016803	79EN0168
R650	RES SMD 1/10W(T) 1% 47Kohm 0603	FN014702	79EN0165
R651	RES SMD 1/10W(T) 1% 47Kohm 0603	FN014702	79EN0165
R652	RES SMD 1/10W(T) 1% 47Kohm 0603	FN014702	79EN0165
R653	RES SMD 1/10W(T) 1% 47Kohm 0603	FN014702	79EN0165
R654	RES SMD 1/10W(T) 1% 2.2Kohm 0603	FN012201	79EN0160
R655	RES SMD 1/10W(T) 1% 2.2Kohm 0603	FN012201	79EN0160
R656	RES SMD 1/10W(T) 1% 180ohm 0603	FN011800	79EN0158
R657	RES SMD 1/10W(T) 1% 12Kohm 0603	FN011202	79EN0157
R658	RES SMD 1/10W(T) 1% 39Kohm 0603	FN013902	79EN0164
R659	RES SMD 1/10W(T) 5% 6.8Kohm 0603	FM010682	79EN0186
R660	RES SMD 1/10W(T) 5% 6.8Kohm 0603	FM010682	79EN0186
R661	RES SMD 1/10W(T) 5% 3.9Kohm 0603	FM010392	79EN0182
R662	RES SMD 1/10W(T) 5% 3.9Kohm 0603	FM010392	79EN0182
R6A1	RES SMD 1/8W(T) 1% 3.9Kohm 0805	FN103901	79EN0209
R6A2	RES SMD 1/8W(T) 1% 27Kohm 0805	FN102702	79PQ1906
R6A3	RES METAL 1/4W/M(T) 1% 15Kohm	FB271502	79EN0451
R6A4	RES METAL 1/4W/M(T) 1% 5.1Kohm	FB275101	79PQ2144
R6A5	RES SMD 1/8W(T) 1% 33Kohm 0805	FN103302	79PQ1907
R6A6	RES SMD 1/8W(T) 1% 27Kohm 0805	FN102702	79PQ1906
R6A7	RES METAL 1/4W/M(T) 1% 15Kohm	FB271502	79EN0451
R6A8	RES METAL 1/4W/M(T) 1% 15Kohm	FB271502	79EN0451
R6A9	RES SMD 1/8W(T) 1% 3.9Kohm 0805	FN103901	79EN0209
R6B1	RES METAL 1/4W/M(T) 1% 15Kohm	FB271502	79EN0451
R6B2	RES SMD 1/8W(T) 1% 43Kohm 0805	FN104302	79EN0215
R6B3	RES CARBON 1/4W/M(T) 1% 10Kohm	FB271002	79PQ1862
R6B4	RES METAL 1/4W/M(T) 1% 12Kohm	FB271202	79EN0450
R6B5	RES SMD 1/8W(T) 1% 82Kohm 0805	FN108202	79EN0219
R6B6	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R6B7	RES METAL 1/4W/M(T) 1% 2.7Kohm	FB272701	79EN0455
R6B8	RES METAL 1/4W/M(T) 1% 15Kohm	FB271502	79EN0451
R6B9	RES SMD 1/8W(T) 1% 39Kohm 0805	FN103902	79EN0213
R6C1	RES SMD 1/8W(T) 1% 43Kohm 0805	FN104302	79EN0215
R6C2	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R6C3	RES SMD 1/8W(T) 1% 27Kohm 0805	FN102702	79PQ1906
R6C4	RES SMD 1/8W(T) 1% 12Kohm 0805	FN101202	79EN0194
R6C5	RES CARBON 1/4W/M(T) 1% 10Kohm	FB271002	79PQ1862
R6C6	RES SMD 1/8W(T) 1% 27Kohm 0805	FN102702	79PQ1906
R6C7	RES SMD 1/8W(T) 1% 10Kohm 0805	FN101002	79PQ1902
R6C8	RES SMD 1/8W(T) 1% 18Kohm 0805	FN101802	79EN0199
R6C9	RES SMD 1/8W(T) 5% 2.2Kohm 0805	FM100222	79EN0226
R6D1	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R6D2	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
R6D3	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R6D4	RES SMD 1/8W(T) 5% 470ohm 0805	FM100471	79EN0232
R6D5	RES SMD 1/8W(T) 5% 56ohm 0805	FM100560	79EN0235
R6D6	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R6D7	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R701	RES MOF 3W/M(A) 5% 75ohm	FB710750	79EN0153
R702	RES MOF 3W/M(A) 5% 75ohm	FB710750	79EN0153
R703	RES MOF 3W/M(A) 5% 75ohm	FB710750	79EN0153
R704	RES CARBON 1/2W/M(T) 5% 3.9Kohm	FA360392	79PQ1857
R705	RES FUSEABLE 1/2W(T) 5% 1ohm	80013911	79EN0331
R706	RES SMD 1/8W(T) 1% 27Kohm 0805	FN102702	79PQ1906
R707	RES SMD 1/8W(T) 1% 4.7Kohm 0805	FN104701	79EN0214
R708	RES MOF 1W/M(B) 5% 0.22ohm	FB480228	79EN0468
R709	RES MOF 1W/M(B) 5% 0.22ohm	FB480228	79EN0468
R710	RES SMD 1/8W(T) 5% 39ohm 0805	FM100390	79EN0231
R711	RES CARBON 1/4W/M(T) 5% 1.8Kohm	FA270182	79PQ1833
R713	RES SMD 1/8W(T) 5% 8.2Kohm 0805	FM100822	79PQ1901
R714	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R715	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R716	RES SMD 1/8W(T) 1% 180Kohm 0805	FN101803	79EN0197
R717	RES SMD 1/8W(T) 5% 6.8Kohm 0805	FM100682	79EN0236
R718	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R719	RES SMD 1/8W(T) 5% 47Kohm 0805	FM100473	79EN0233
R720	RES METAL 1/4W/M(T) 1% 56Kohm	FB275602	79EN0463
R721	RES SMD 1/8W(T) 5% 36Kohm 0805	FM100363	79EN0230
R722	RES METAL 1/4W/M(T) 1% 4.3Kohm	FB274301	79PQ1871
R723	RES SMD 1/8W(T) 1% 82Kohm 0805	FN108202	79EN0219
R724	RES SMD 1/8W(T) 1% 39Kohm 0805	FN103902	79EN0213
R725	RES SMD 1/8W(T) 1% 100Kohm 0805	FN101003	79EN0192
R726	RES SMD 1/8W(T) 1% 390Kohm 0805	FN103903	79EN0212
R727	RES SMD 1/8W(T) 1% 120Kohm 0805	FN101203	79EN0193
R728	RES METAL 1/4W/M(T) 1% 33Kohm	FB273302	79PQ1870
R729	RES METAL 1/4W/M(T) 1% 5.6Kohm	FB275601	79PQ1967
R730	RES METAL 1/4W/M(T) 1% 22Kohm	FB272202	79EN0454
R731	RES SMD 1/8W(T) 5% 15Kohm 0805	FM100153	79EN0224
R732	RES SMD 1/8W(T) 5% 4.7Kohm 0805	FM100472	79PQ1899
R733	RES SMD 1/8W(T) 1% 1.5Kohm 0805	FN101501	79EN0191
R734	RES SMD 1/8W(T) 1% 100Kohm 0805	FN101003	79EN0192
R735	RES SMD 1/8W(T) 5% 2.2Kohm 0805	FM100222	79EN0226
R736	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R737	RES SMD 1/8W(T) 5% 1.5Mohm 0805	FM100155	79EN0220
R738	RES CARBON 1/4W/M(T) 5% 1.5Mohm	FA270155	79EN0431
R739	RES SMD 1/8W(T) 1% 1.5Kohm 0805	FN101501	79EN0191
R740	RES SMD 1/8W(T) 1% 100Kohm 0805	FN101003	79EN0192
R741	RES METAL 1/4W/M(T) 1% 1Kohm	FB271001	79PQ1861
R742	RES SMD 1/8W(T) 1% 10Kohm 0805	FN101002	79PQ1902
R743	RES SMD 1/8W(T) 1% 270Kohm 0805	FN102703	79EN0207
R744	RES METAL 1/4W/M(T) 1% 1Kohm	FB271001	79PQ1861
R745	RES SMD 1/8W(T) 1% 270Kohm 0805	FN102703	79EN0207
R746	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R747	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R748	RES SMD 1/8W(T) 5% 0ohm 0805	FM100000	79PQ1890
R750	RES MOF 3W/M(A) 5% 75ohm	FB710750	79EN0153
R751	RES SMD 1/8W(T) 1% 150Kohm 0805	FN101503	79EN0195
R752	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R7A2	RES SURGE 1/2W 5% 3.3Kohm	80013811	79EN0327
R7A3	RES CARBON 1/2W/M(T) 5% 330Kohm	FA360334	79EN0444
R7A4	RES METAL 1/4W/M(T) 1% 8.2Kohm	FB278201	79PQ1876
R7A5	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R7A6	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R7B1	RES FUSEABLE /T 1/4W 5% 10ohm	80017981	79EN0391
R7B2	RES CARBON 1/2W/M(T) 5% 18ohm	FA360180	79EN0441
R7B5	RES FUSEABLE 1/4W(T) 5% 470ohm	80013861	79EN0329
R7B6	RES MOF 1W/M(B) 5% 10Kohm	FB480103	79EN0467
R7B7	RES SMD 1/8W(T) 1% 1Kohm 0805	FN101001	79EN0200
R7B9	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R802	RES SMD 1/8W(T) 1% 30Kohm 0805	FN103002	79EN0210
R803	RES SMD 1/8W(T) 1% 22Kohm 0805	FN102202	79PQ1905
R809	RES SMD 1/8W(T) 1% 560Kohm 0805	FN105603	79EN0217
R811	RES SMD 1/8W(T) 1% 560Kohm 0805	FN105603	79EN0217
R813	RES SMD 1/8W(T) 1% 560Kohm 0805	FN105603	79EN0217
R817	RES METAL 1/4W/M(T) 1% 100Kohm	FB271003	79EN0449
R818	RES SMD 1/8W(T) 1% 560Kohm 0805	FN105603	79EN0217
R820	RES METAL 1/4W/M(T) 1% 100Kohm	FB271003	79EN0449
R823	RES SMD 1/8W(T) 1% 560Kohm 0805	FN105603	79EN0217
R825	RES METAL 1/4W/M(T) 1% 100Kohm	FB271003	79EN0449
R826	RES SMD 1/8W(T) 5% 100Kohm 0805	FM100104	79EN0221
R827	RES MOF 3W/M(A) 5% 82ohm	FB710820	79EN0154
R828	RES SMD 1/8W(T) 1% 100Kohm 0805	FN101003	79EN0192
R829	RES SMD 1/8W(T) 1% 560Kohm 0805	FN105603	79EN0217
R831	RES SMD 1/8W(T) 1% 100Kohm 0805	FN101003	79EN0192
R832	RES METAL 1/4W/M(T) 1% 100Kohm	FB271003	79EN0449
R833	RES METAL 1/4W/M(T) 1% 5.1Kohm	FB275101	79PQ2144
R834	RES SMD 1/8W(T) 5% 100ohm 0805	FM100101	79PQ1891
R835	RES MOF 3W/M(A) 5% 82ohm	FB710820	79EN0154

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
R8A2	RES SMD 1/8W(T) 1% 3.3Kohm 0805	FN103301	79EN0208
R8A3	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R8A4	RES SMD 1/8W(T) 5% 6.8Kohm 0805	FM100682	79EN0236
R8A5	RES SMD 1/8W(T) 5% 6.8Kohm 0805	FM100682	79EN0236
R8A6	RES MOF 3W/M(A) 5% 2.2ohm	FB710229	79PQ1070
R8A7	RES MOF 2W/M(B) 5% 68ohm	FB570680	79EN0471
R8A9	RES MOF 2W/M(B) 5% 68ohm	FB570680	79EN0471
R8B1	RES SMD 1/8W(T) 1% 3.3Kohm 0805	FN103301	79EN0208
R8B2	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R8B3	RES SMD 1/8W(T) 5% 6.8Kohm 0805	FM100682	79EN0236
R8B4	RES SMD 1/8W(T) 5% 6.8Kohm 0805	FM100682	79EN0236
R8B7	RES MOF 3W/M(A) 5% 1ohm	FB710010	79EN0152
R901	RES CARBON 1/2W(T) 5% 470Kohm	FA330474	79PQ1041
R904	RES METAL 1/4W/M(T) 1% 470Kohm	FB274703	79EN0459
R905	RES METAL 1/4W/M(T) 1% 470Kohm	FB274703	79EN0459
R906	RES SMD 1/8W(T) 1% 220Kohm 0805	FN102203	79EN0205
R907	RES SMD 1/8W(T) 1% 100Kohm 0805	FN101003	79EN0192
R908	RES SMD 1/8W(T) 1% 10Kohm 0805	FN101002	79PQ1902
R909	RES CARBON 1/4W/M(T) 5% 1Kohm	FA270102	79PQ1828
R910	RES MOF 2W/M(B) 5% 0.22ohm	FB570228	79PQ1621
R911	RES SMD 1/8W(T) 5% 22Kohm 0805	FM100223	79PQ1897
R912	RES CARBON 1/4W/M(T) 5% 12ohm	FA270120	79EN0429
R913	RES METAL 1/4W/M(T) 1% 510Kohm	FB275103	79EN0462
R914	RES METAL 1/4W/M(T) 1% 510Kohm	FB275103	79EN0462
R915	RES METAL 1/4W/M(T) 1% 510Kohm	FB275103	79EN0462
R916	RES SMD 1/8W(T) 1% 24Kohm 0805	FN102402	79EN0206
R917	RES SMD 1/8W(T) 1% 10Kohm 0805	FN101002	79PQ1902
R918	RES METAL 1/4W/M(T) 1% 330Kohm	FB273303	79EN0457
R919	RES METAL 1/4W/M(T) 1% 330Kohm	FB273303	79EN0457
R920	RES METAL 1/4W/M(T) 1% 150Kohm	FB271503	79EN0452
R921	RES SMD 1/8W(T) 1% 47Kohm 0805	FN104702	79PQ1909
R922	RES MOF 2W/M(B) 5% 68Kohm	FB570683	79EN0150
R923	RES MOF 2W/M(B) 5% 68Kohm	FB570683	79EN0150
R924	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R925	RES SMD 1/8W(T) 1% 2.4Kohm 0805	FN102401	79EN0203
R926	RES CARBON 1/4W/M(T) 5% 3.9ohm	FA270399	79EN0435
R927	RES SMD 1/8W(T) 5% 680ohm 0805	FM100681	79EN0237
R928	RES CEMENT /B 5W M 5% 0.33ohm	80018461	79EN0401
R929	RES METAL 1/4W/M(T) 1% 3.3Kohm	FB273301	79PQ1869
R933	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R934	RES CARBON 1/4W/M(T) 5% 12ohm	FA270120	79EN0429
R937	RES MOF 2W/M(B) 5% 0.22ohm	FB570228	79PQ1621
R938	RES CARBON 1/4W/M(T) 5% 270ohm	FA270271	79PQ1836
R939	RES MOF 2W/M(B) 5% 47Kohm	FB570473	79EN0470
R940	RES MOF 2W/M(B) 5% 68Kohm	FB570683	79EN0150
R941	RES MOF 2W/M(B) 5% 68Kohm	FB570683	79EN0150
R944	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R946	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R950	RES CARBON 1/4W/M(T) 5% 4.7ohm	FA270479	79EN0438
R951	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R952	RES CARBON 1/4W/M(T) 5% 4.7ohm	FA270479	79EN0438
R953	RES CARBON 1/4W/M(T) 5% 12ohm	FA270120	79EN0429
R954	RES CARBON 1/2W/M(T) 5% 68ohm	FA360680	79PQ1859
R960	R METAL 1/4W 51K F (T)	FJ275102	79EN0777
R961	R METAL 1/4W 51K F (T)	FJ275102	79EN0777
R962	R METAL 1/4W 68K F (T)	FJ276802	79EN0778
R963	RES METAL 1/4W/M(T) 1% 1Kohm	FB271001	79PQ1861
R964	RES CARBON 1/2W/M(T) 5% 180Kohm	FA360184	79PQ1852
R965	RES SMD 1/8W(T) 5% 4.7Kohm 0805	FM100472	79PQ1899
R966	RES METAL 1/4W/M(T) 1% 1Kohm	FB271001	79PQ1861
R967	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R968	RES CARBON 1/4W/M(T) 5% 82Kohm	FA270823	79EN0439
R969	RES SMD 1/8W(T) 5% 8.2Kohm 0805	FM100822	79PQ1901
R970	RES SMD 1/8W(T) 5% 12Kohm 0805	FM100123	79EN0223
R971	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
R972	RES SMD 1/8W(T) 5% 4.7Kohm 0805	FM100472	79PQ1899
R973	RES SMD 1/8W(T) 5% 4.7Kohm 0805	FM100472	79PQ1899
R974	RES CARBON 1/4W/M(T) 5% 47ohm	FA270470	79PQ2009
R975	RES CARBON 1/4W/M(T) 5% 1Kohm	FA270102	79PQ1828
R976	RES METAL 1/4W/M(T) 1% 9.1Kohm	FB279101	79EN0466
R977	RES METAL 1/4W/M(T) 1% 1.5Kohm	FB271501	79PQ1965
R978	RES METAL 1/4W/M(T) 1% 10Kohm	FB271002	79PQ1862
R979	RES CARBON 1/4W/M(T) 5% 1Kohm	FA270102	79PQ1828
R980	RES SMD 1/8W(T) 5% 1Kohm 0805	FM100102	79PQ1892
R984	RES MOF 1W/M(B) 5% 100ohm	FB480101	79PQ1062
R985	RES METAL 1/4W/M(T) 1% 2Kohm	FB272001	79PQ1865
R989	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R990	RES CARBON 1/4W/M(T) 5% 1Kohm	FA270102	79PQ1828
R991	RES CARBON 1/4W/M(T) 5% 10Kohm	FA270103	79PQ2003
R993	RES CARBON 1/4W/M(T) 5% 100ohm	FA270101	79PQ1827
R996	RES MOF 1W/M(B) 5% 2.2ohm	FB480229	79EN0149
R997	RES CARBON 1/2W/M(T) 5% 27Kohm	FA360273	79EN0442
R998	RES CARBON 1/4W/M(T) 5% 1Kohm	FA270102	79PQ1828
R999	RES SMD 1/8W(T) 5% 10Kohm 0805	FM100103	79PQ1893
SWITCH			

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
SW101	TACT SW 1P 100±50g	80000251	79PQ0028
SW102	TACT SW 1P 100±50g	80000251	79PQ0028
SW103	TACT SW 1P 100±50g	80000251	79PQ0028
SW104	TACT SW 1P 100±50g	80000251	79PQ0028
SW105	TACT SW 1P 100±50g	80000251	79PQ0028
SW106	TACT SW 1P 100±50g	80000251	79PQ0028
SW107	TACT SW 1P 100±50g	80000251	79PQ0028
SW9A0	POWER SW ESB92S21B TV5	80002021	79PQ0974
TRANS			
T501	TRANS H-DRIVE EE2519	80019151	79EN0244
T550	H.OUT X'FM 0133016700 (NSV)	80014951	79EN0373
T5C0	TRANS CURRENT 16LAZA	80018961	79EN0243
T701	FBT MSU1FVH211	80018661	79EN0041
T7A1	TRANS DBF 80019751 (CLOVER)	80019751	79EN0063
T901	TRANS POWER EER40(CLOVER)	80017681	79EN0016
T902	TRANS POWER-SUB EER22(NAMYANG)	80018811	79EN0044
THERMISTOR			
TH100	THERMISTOR NRD3103K400K03FMT	80014781	79EN0363
TH901	THERMISTOR SCK15105LI	80019281	79EN0050
TH902	THERMISTOR PTC PTH451A4R5Q23	80014791	79EN0364
CRT			
X3A02	CRT M51LVT42X MITSUBISHI		3A302204
ASSY PCBs			
X02	MAIN PWB ASSY(C22BW701)		7A940402
X04	MIXSUB PWB ASSY(C22BW701)		7A940412
X05	POWER PWB ASSY(C22BW701)		7A940422
OTHERS (ELECTRIC COMPONENTS)			
RL901	RELAY G5PA-2 DC12/ALA2PF12	80014891	79EN0367
VR5A1	VR CARBON 6mm 3K B	FF310302	79EN0772
X100	X'TAL 49U 20MHz +/-30PPM	EM020004	79PQ1824
OTHERS			
BAR CODE	LABEL S/N	15201381	79EN0764
BAR CODE	LABEL S/N	15201381	79EN0764
BAR CODE	LABEL S/N	15201381	79EN0764
BAR CODE	LABEL S/N	15201381	79EN0764
BQ550	BRACKET(HOLDER-TR)	12000701	79EN0092
CENTER HOLE	EDGE SADDLE(SB-01)	18000631	79EN0315
CNCRT	SOCKET CRT CVT3280-6101	80019181	79EN0048
DSUB x2	SCREW(JFS-4S-B1WM(TYPE1)	14300191	79EN0310
E200	SPRING-FINGER	13100091	79EN0304
E210	BRACKET-PIN	13100081	79EN0303
E211	BRACKET-PIN	13100081	79EN0303
E212	BRACKET-PIN	13100081	79EN0303
E213	BRACKET-PIN	13100081	79EN0303
G1	GROMMET(2.5)	80013461	79EN0318
G1	GROMMET(2.5)	80013461	79EN0318
G1	GROMMET(2.5)	80013461	79EN0318
G2	GROMMET(2.0)	80007631	79EN0316
G2	GROMMET(2.0)	80007631	79EN0316
G3	GROMMET(1.6)	80007641	79EN0317
G3	GROMMET(1.6)	80007641	79EN0317
HD901	HEAT SINK(40*12.5*40)	12800691	79EN0134
HD964	HEAT SINK(15*6*25)	12800751	79EN0133
HD965	HEAT SINK(15*6*25)	12800751	79EN0133
HD971	HEAT SINK(15*6*40)	12800761	79EN0302
HIC210	HEAT SINK(55*15*26)	12800671	79EN0300
HIC401	HEAT SINK(60*15*63)	12800641	79EN0298
HIC8A1	HEAT SINK(60*15*45)	12800622	79EN0718
HIC902	HEAT SINK(45*15*45)	12800651	79EN0299
HIC903	HEAT SINK(15*6*25)	12800751	79EN0133
HIC923	HEAT SINK(15*6*40)	12800761	79EN0302
HQ550	HEAT-SINK (FOR FBT)	12800721	79EN0007
HQ563	HEAT SINK(15*6*25)	12800751	79EN0133
HQ564	HEAT SINK(15*6*25)	12800751	79EN0133
HQ566	HEAT SINK(15*6*25)	12800751	79EN0133
HQ567	HEAT SINK(15*6*25)	12800751	79EN0133
HQ7B1	HEAT SINK(42*11*30)	12800631	79EN0297
HQ901	HEAT SINK(45*15*45)	12800681	79EN0301
PCN210	WIRE 7P-7P 1007 26AWG 55mm	80013681	79EN0326
PCN211	WIRE 6P-6P 1007 26AWG 400mm	80018511	79EN0037
PCN7B1	WIRE 2P-2P 1533 26AWG 500mm	80019861	79EN0065
PCN801	WIRE 8P-4P(L)*4P(R) 1007 26AWG L300mm R400mm	80019542	79EN0247
PCN9A0	WIRE 10P-10P 1007 26AWG 450mm	80018481	79EN0034
PCN9A1	WIRE 9P-9P 1007 26AWG 550mm	80018521	79EN0038
PFG202	WIRE BOAD IN 1P-1P 1015 18AWG 80mm	80019551	79EN0057
PFG203	WIRE BOAD IN 1P-1P 1015 18AWG 80mm	80019551	79EN0057
RADIATOR-HV	LEAD-CLAMPER20*30 NYLON6	18000611	79EN0009
RADIATOR-HV2	LEAD-CLAMPER7*4 NYLON66 94V-2	18000641	79EN0010
RPC403	RUBBER PAD	17001081	79EN0768
RPC406	RUBBER PAD	17001081	79EN0768
RPR11B	RUBBER PAD	17001081	79EN0768
SD550	M3*10+WASHER+PM+SPW	14300121	79EN0308
SD901	M3*10+WASHER+PM+SPW	14300121	79EN0308
SD964	M3*10+WASHER+PM+SPW	14300121	79EN0308
SD965	M3*10+WASHER+PM+SPW	14300121	79EN0308

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
SD971	M3*10+WASHER+PM+SPW	14300121	79EN0308
SG200B	SPAKER GAP 300V±30%	80007541	79EN0239
SG200G	SPAKER GAP 300V±30%	80007541	79EN0239
SG200R	SPAKER GAP 300V±30%	80007541	79EN0239
SG205S	SPARK GAP 1.5KV±500V	80002201	79PQ1164
SG701	SPARK GAP DSP-201M-A21F	80015181	79EN0379
SG702	SPAKER GAP 1.5KV±500V	80002201	79PQ1164
SHQ550	SCREW(M3*8)SOLDER(FOR FBT)	14000161	79EN0305
SIC210	M3*10+WASHER+PM+SPW	14300121	79EN0308
SIC401	M3*10+WASHER+PM+SPW	14300121	79EN0308
SIC8A1	M3*14+WASHER+PM+SPW	14300131	79EN0309
SIC902	M3*10+WASHER+PM+SPW	14300121	79EN0308
SIC903	M3*10+WASHER+PM+SPW	14300121	79EN0308
SIC923	M3*10+WASHER+PM+SPW	14300121	79EN0308
SIG WIRE	WIRE 1007#26L30 BLK	80020091	79EN0773
SQ550	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ563	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ564	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ566	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ567	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ701	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ7B1	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ7B2	M3*10+WASHER+PM+SPW	14300121	79EN0308
SQ901	M3*10+WASHER+PM+SPW	14300121	79EN0308
SRIC401	SILICON RUBBER(18X25XT=0.45)	17000701	79EN0312
SRQ550	SILICON RUBBER(44X28XT=0.45)	80019921	79EN0068
SW LEAD-WIRE	LEAD-CLAMPER12*12 NYLON6	18000601	79EN0313
VIDEO I-O	SCREW(3*8MFZn -C)	14000191	79EN0306
WCN104	WIRE 4P-4P 1007 26AWG 350mm	80019531	79EN0246
WCN212	WIRE FLAT 19P	80019601	79EN0412
WCN550	WIRE DY MITSUBISHI 22	80018551	79EN0039
WCN804	WIRE 6P-6P 1007 26AWG 430mm	80018501	79EN0036
WCN8A1	WIRE DDCP MITSUBISHI 22 260mm	80018542	79EN0248
WCN9A3	WIRE 3P-3P 1672 22AWG 280mm	80018492	79EN0035
X2801	LEAD-CLAMPER,NYLON6		25284821
X2801	BAND-RIVET,NAD-06		25285191
X2801	CLAMPER,FCR-45,V0		25285221
X2802	LEAD-CLAMPER,232-Y1134-00		25284751
X2802	LEAD-CLAMPER,NYLON6		25284831
X2803	LEAD-CLAMPER,NYLON6		25284821
X2803	LEAD-CLAMPER,WS-2NS		25285211
X2804	CLAMPER,FCR-45,V0		25285221
X2804	PIPE-CLAMP		25285621
X2805	EDGE-SADDLE,EDS-1208U		25285131
X3203	OUTER-BEZEL-UNIT,LIGHT		25326731
X4A02	CPM 890P347A20		4A910003
X5501	SPRING,SUS304		25550011
X5501	EMS-TB,SECC-C		25550881
X5501	SHIELD-LEFT,A1100P-H24		25550931
X5501	SHIELD-TOP,A1100P-H24		25550941
X5502	EMS-S,SECC-C		25550891
X5502	HOLDER-TOP,SPTE		25551011
X5503	SPRING,SUS304		25550011
X5504	SPRING,SUS304		25550021
X6101	INSULATOR-TOP,FORMEX-18		25619691
X6101	BARRIER,N-7 T0.5		25619791
X6A01	L NOISE FILTER SUP-L3G-E-		6A101100
X6A01	L COIL SET 17.1OHM K		6A132205
X7901	LABEL-CAUTION,WHT PAPER		25794471
X7901	LABEL-PROTECT,PET		25794671
X7902	LABEL-PROTECT,PET		25794681
X7902	PROTECT-LABEL		25794791
X7A01	PW CORD EUR 2.5M 3P GRY		7A082008
X7A01	SILICONE-GUM KE40RTV 150G		7A900001
X7A02	CABLE VIDEO GRY DSUB-DSUB		7A390018
X7A02	TAPE ACETATE 570F 3000X19		7A900002
X7A03	ACCESSORY CP871C217A20		7A812371
X7A03	WEDGE		7A900003
X7A04	TAPE GLASS 0.18-25X80000		7A900004
X8401	CUSHION		25840621
X8401	PACKING-CASE CP984B471A10		25840771
X8402	PACKING-BAG		25841321
X8501	SCREW 5X20		25853451
X8501	SCREW-TB-CAP 3X8		25853891
X8501	SCREW-TB-CAP 3X8		25853891
X8501	SCREW-TB-CAP 3X8		25853891
X8502	SCREW-TB 4X16		25853511
X8502	SCREW-TB-CAP 3X8		25853891
X8502	SCREW-TB 4X12		25854101
X8503	SCREW-TB-BIND-W 3X8		25853421
X8504	SCREW-TB 3X8		25853481
X8505	SCREW-SEMS-W M4X0.7-8		25854141
X9D01	TAPE		25619971
X9D01	SILICONE G KW-4890W 330ML		9D010001
X9D01	TAPE AL CCJ-36-201-W20MM		9D030006

SYMBOL NO.	DESCRIPTION/SPECIFICATION		PART NO.
X9D01	TAPE CARTON 75*500M		9D030018
X9D01	GROUND-LABEL		9D040001
X9D01	LOCK-PEINT ACRIC1000 481		9D050001
X9D02	BOND HOT MELT MP786		9D010007
X9D02	SILICONE GU KE-4890W 140G		9D010008
X9D02	RIBBON-B110CX(W=90MM)		9D050002
X9D02	RIBBON-B110CX(W=60MM)		9D050003
X9D03	TAPE MASKIN NO.7290 CREAM		9D030015
FOR BRCKT	CARD-SPACER(CBS-6K)	18000591	79EN0008
FOR BRCKT	SCREW(3*8MFZn -C)	14000191	79EN0306
FOR BRCKT	LEAD-CLAMPER	18000621	79EN0314
FOR MPCB	SCREW(3*8TB-SEMS)	14000201	79EN0307
FOR MPCB2	LEAD-CLAMPER12*12 NYLON6	18000621	79EN0314
FOR PPCB	SCREW(3*8TB-SEMS)	14000201	79EN0307
FOR VPCB	SCREW(3*8TB-SEMS)	14000201	79EN0307
	CHASSIS BASE	12000671	79EN0002
	BRACKET(POWER)	12000681	79EN0003
	PLATE SHIELDING(REAR)	12300581	79EN0004
	PLATE-SHIELDING(POWER)	12300641	79EN0005
	CORE FERRITE F5RH16*17*9	80019891	79EN0066
	CORE FERRITE T23.8*14*11.4	80019901	79EN0067
	PLATE SHIELDING(VIDEO)	12300611	79EN0073
	PLATE SHIELDING(CONNECTOR)	12300711	79EN0142
	CABLE TIE GT-100M	17000321	79EN0311

For Diamond Plus 230SB (B)		
X3201	BACK-COVER-UNIT,LIGHT,GRY	25326701
X3202	REAR-PANEL,LIGHT GRAY	25326541
X3204	T/S-STAND-UNIT,LIGHT,GRAY	25326761
X3205	INNER-BEZEL-UNIT,LIGHT	25326781
X7001	LABEL-RATING,YUPO 0.11	25703561
X7002	PRINTING-SPEC	25703722
X7901	LABEL-SHIPPING	25794331
X7902	LABEL,YUPO T0.11	25794391
For Diamond Plus 230SB-BK (B)		
X3201	BACK-COVER-UNIT,DARK,ROOF	25326711
X3202	REAR-PANEL,DARK,ROOF,GRAY	25326811
X3204	T/S-STAND-UNIT,DARK,ROOF	25326771
X3205	INNER-BEZEL-UNIT,DARK,ABS	25326791
X7001	LABEL-RATING,YUPO 0.11	25703571
X7002	PRINTING-SPEC	25703732
X7901	LABEL-SHIPPING	25794341
X7902	LABEL,YUPO T0.11	25794401
X7903	LABEL-BLACK	25794641